A REGULAR MEETING OF THE OPERATING COMMITTEE
of the
CENTRAL COAST WATER AUTHORITY

will be held at 9:00 a.m., on Thursday, January 11, 2024
at 255 Industrial Way, Buellton

Members of the public may participate by video call or telephone via
URL: https://meetings.ringcentral.com/j/1476583124
or via telephone by dialing 1 (623) 404-9000 and entering code 147 658 3124 #

Public Comment on agenda items may occur via video call or telephonically, or by submission to the Board Secretary via email at lfw@ccwa.com no later than 8:00 a.m. on the day of the meeting. In your email, please specify (1) the meeting date and agenda item (number and title) on which you are providing a comment and (2) that you would like your comment read into the record during the meeting. If you would like your comment read into the record during the meeting (as either general public comment or on a specific agenda item), please limit your comments to no more than 250 words.

Every effort will be made to read comments into the record, but some comments may not be read due to time limitations. Please also note that if you submit a written comment and do not specify that you would like this comment read into the record during the meeting, your comment will be forwarded to Board members for their consideration.

Pursuant to Government Code section 54957.5, non-exempt public records that relate to open session agenda items and are distributed to a majority of the Board less than seventy-two (72) hours prior to the meeting will be available on the CCWA internet web site, accessible at https://www.ccwa.com.

I. Call to Order and Roll Call

II. CLOSED SESSION
CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION
Government Code section 54956.9(d) (1)
Name of case: Central Coast Water Authority, et al. v. Santa Barbara County Flood Control and Water Conservation District, et al. (Case No. 21CV02432)

III. Public Comment – (Any member of the public may address the Committee relating to any matter within the Committee's jurisdiction. Individual Speakers may be limited to five minutes; all speakers to a total of fifteen minutes.)

IV. ✳ **Consent Calendar**
A. Minutes of the July 13, 2023 Operating Committee Meeting
Staff Recommendation: Approve Consent Calendar.

V. Executive Director's Report
A. Operations Update
Staff Recommendation: Informational item only.
B. Water Supply Situation Report
Staff Recommendation: Informational item only.
✳ C. Pacheco Reservoir Expansion Project
Staff Recommendation: Informational item only.
✳ D. Santa Ynez II Long-Term Project Overview
Staff Recommendation: Informational item only.
♦ E. Draft CCWA Water Transfer Administrative Policies
Staff Recommendation: Informational item only.
F. Warren Act Contract Renewal Update
Staff Recommendation: Informational item only.

Continued

✳ Indicates attachment of document to agenda packet
♦ Additional materials related to the item will be posted at CCWA.com prior to meeting.

255 Industrial Way
Buellton, CA 93427
(805) 688-2292
Fax (805) 686-4700
www.ccwa.com

- ✶ G. FY 2024/25 Budget Preparation Schedule
  Staff Recommendation: Informational item only.
- ✶ H. The Economy of the State Water Project
  Staff Recommendation: Informational item only.

VI. Reports from Committee Members for Information Only

VII. Date of Next Regular Meeting: March 14, 2024

VIII. Adjournment

MINUTES OF THE

CENTRAL COAST WATER AUTHORITY
OPERATING COMMITTEE

July 13, 2023

I. Call to Order and Roll Call

Mr. Garcia, Committee Chair, called the July 13, 2023, Central Coast Water Authority Operating Committee meeting to order at 9:00 a.m.

Committee members present:

Paeter Garcia	-	Santa Ynez River Water Conservation District, ID#1
Rose Hess	-	City of Buellton
Shad Springer	-	City of Santa Maria
Ryan Drake	-	Goleta Water District

The Committee went to closed session at 9:03.

II. Closed Session

CONFERENCE WITH LEGAL COUNSEL – ANTICIPATED LITIGATION
Initiation of litigation pursuant to Government Code section 54956.9(d) (4): 1 case

III. Return to Open Session

The Committee returned to open session at 9:39 a.m.

Ms. Hastings, CCWA General Counsel, announced there were no reportable actions as a result of closed session.

IV. Public Comment

There was no public comment.

V. Consent Calendar

A. Approve Minutes of the March 8, 2023 Operating Committee Meeting

Motion to approve the consent calendar was made by Mr. Springer, seconded by Ms. Hess, and carried with all in favor and none opposed and Mr. Drake abstaining.

VI. Executive Director's Report

A. Operations Update

Mr. Brady reported on plant production, chemical costs, and totals pumped into Lake Cachuma.

	Plant Production (AF)	Chemical Costs ($/AF)	SYPF Pumping (AF)
April	912.70	$70.60	0

May	1,190.48	$61.96	1.01
June	1,512.00	$49.36	0

Other activities during the period included:

- Update of critical plans including risk management plans, process safety plans and spill prevention controls and countermeasures
- ELAP report responses for laboratory operations
- New process for Safety Data Sheets for digitalization on cloud based service
- Hazardous materials plan update for Santa Ynez Pumping Plant, Tank 5 and Tank 7 and associated training
- Response to hazardous materials plan inspection
- Unannounced Cal OSHA inspection and response to associated documentation request
- Response to Cal OSHA complaint
- Repair of erosion at Casmalia landfill access road
- Several tours of CCWA facilities by CCWA member agencies and SLO County officials and staff
- Chemical request for bids
- Vehicle procurements
- Respiratory program update and implementation of changes
- Recruiting for Safety Officer, Operations Manager and Water Treatment Plant Operator Trainee positions
- Water accounting reconciliation with DWR records

B. Winter Shutdown Timing and Possible Postponement

DWR has asked CCWA if cancelling or modifying winter shutdown would be of assistance to CCWA in managing water supplies. Mr. Brady reviewed the potential impacts to deliveries in the event San Luis Reservoir is spilling or is not spilling and the availability of Article 21, Article 56c and Article 14B water.

The Committee generally discussed the options, including the possibility that Cachuma would be full and South Coast agencies would not be able to take delivery of water. CCWA's need for facilities maintenance that can only take place during shutdown was also discussed.

DWR will need to be informed to CCWA's decision within the next month, and Mr. Stokes, CCWA Executive Director, requested an email be sent to all project participants asking for input on the decision.

C. Water Supply Situation Report

Mr. Stokes reviewed the delivery status using the current Table A allocation of 100%. Water debt and banked water amounts for CCWA participants were reviewed, totaling 59,570 AF of water available for delivery as of June 30, 2023.

CCWA is exploring the potential to participate in a sale or unbalanced exchange for some of its available Table A entitlement and Mr. Stokes requested input from project participants as to their interest in a transaction. The Board of Directors would have to approve an exchange or sale program, which would be modeled on the Supplemental Water Purchase Program.

D. Update on SeaWell Ocean Desalination Project

Mr. Peter Stricker, SeaWell representative, provided a presentation on the floating offshore desalination project SeaWell is working on in collaboration with Vandenberg Space Force Base. He explained the potential to connect the system to CCWA's facilities is being conceptually considered as a method of increasing Santa Barbara County's water security and requested input from CCWA and its members as to interest in participation in the project.

E. Update on Aquaterra and Antelope Valley East Kern Water Agency Water Banks

Mr. Stokes stated that Antelope Valley East Kern Water Agency (AVEK) has determined to put Phase II of their water bank on hold pending implementation of Phase I. Aquaterra Water Bank representatives will be meeting with City of Santa Barbara staff at the end of July, and Mr. Stokes asked that any project participants who may be interested in the Aquaterra Water Bank contact him.

F. DWR Calendar Year 2024 Statement of Charges

Ms. Dessi Mladenova, CCWA Controller, reviewed the timing of CCWA's annual budget preparation and the DWR Statement of Charges (SOC), noting that due to the receipt of the SOC for calendar year (CY) 2024 after completion of the CCWA Fiscal Year (FY) 2023/24 budget, estimates were used that require adjustment after the SOC is received.

The cost components with the biggest differences were reviewed by Ms. Mladenova, who noted an increase in the Transportation Minimum OMP&R component of $1.5 Million followed by an increase in the Transportation Capital charges of $1 Million and a combined increase in the Water System Revenue Bond and Coastal Branch of $0.4 Million. The reason for the increase in the Transportation Minimum OMP&R is a projected increase in CY 2024 costs of $1 Million as well as a historic true up adjustment of $2 Million. The increase in the Transportation Capital cost component is due to a reduction in the rate management credits planned for CY 2024 from the estimated $2.7 Million to $0.5 Million. The Delta Water Charge was estimated in the budget higher than the actual 2024 scheduled payments by approximately $0.4 Million.

In total, the charges are almost $2.6 Million higher than the estimates used in the FY 2023/24 Budget. The additional charges due for FY 2023/24 fixed DWR costs will be invoiced in September 2023.

VII. Reports from Committee Members for Information Only

There were no reports from the Committee members.

VIII. Date of Next Regular Meeting:

October 12, 2023 is the date of the next Regular meeting, which will be held in person at 255 Industrial Way, Buellton.

IX. Adjournment

The meeting was adjourned at 11:26 AM.

Respectfully submitted,

_____

Elizabeth F. Watkins
Secretary to the Board

CENTRAL COAST WATER AUTHORITY

MEMORANDUM

January 4, 2024

TO: CCWA Operating Committee

FROM: Ray A. Stokes
Executive Director

SUBJECT: Pacheco Reservoir Expansion Project

DISCUSSION

The Santa Clara Valley Water District, along with current partners, San Benito County Water District and the Pacheco Pass Water District, are currently engaged in efforts to expand the Pacheco Reservoir in Northern California with opportunities for additional partners to share up to 50,000 AF of additional storage capacity in the enlarged reservoir.

Representatives from the project team will provide an overview of the reservoir expansion project for consideration by CCWA participants at the January 11, 2023 CCWA Operating Committee meeting.

The attached brochure provides a brief overview of the project.

REQUESTED ACTION

None. Informational only.

RAS

Attachment

Valley Water

Clean Water • Healthy Environment • Flood Protection

San Benito County Water District

PPWD Pacheco Pass Water District

DIVERSIFY YOUR INVESTMENT PORTFOLIO WITH A

UNIQUE PARTNERSHIP OPPORTUNITY

PACHECO RESERVOIR EXPANSION PROJECT

ABOUT THE RESERVOIR

Climate change predictions suggest future droughts will be more severe due to decreased snowpack in the Sierra Nevada. An expanded Pacheco Reservoir will add available storage for Valley Water and its partners to capture water during wet years.

Located on the lower end of North Fork Pacheco Creek, the expanded reservoir project includes the construction of a dam upstream of the existing dam, a pump station, a pipeline and other supporting infrastructure. The expanded reservoir would be filled by a combination of rainfall, runoff from the watershed upstream of the new dam, and imported water supplies.

Partners can access water stored in an expanded Pacheco Reservoir through Valley Water's local system and the extensive state and federal systems via San Luis Reservoir.

Water operations through the San Luis Reservoir and proposed Pacheco Reservoir expansion area

BENEFITS TO PARTNERS

Offers a wide reach of potential benefits through connection to San Luis Reservoir and operations of the state and federal conveyance systems.

For Bay Area regional drought supply and emergencies, leverages Valley Water's existing system and enhances dry-year supply for agriculture, urban use, and wildlife refuges.

Enhances exchange possibilities through Valley Water's Semitropic storage and any future groundwater storage rights.

Helps meet the Sustainable Groundwater Management Act (SGMA) groundwater sustainability objectives south of Delta.

Captures wet year supplies available from the Central Valley and State Water projects subject to San Luis Reservoir carryover limitations.

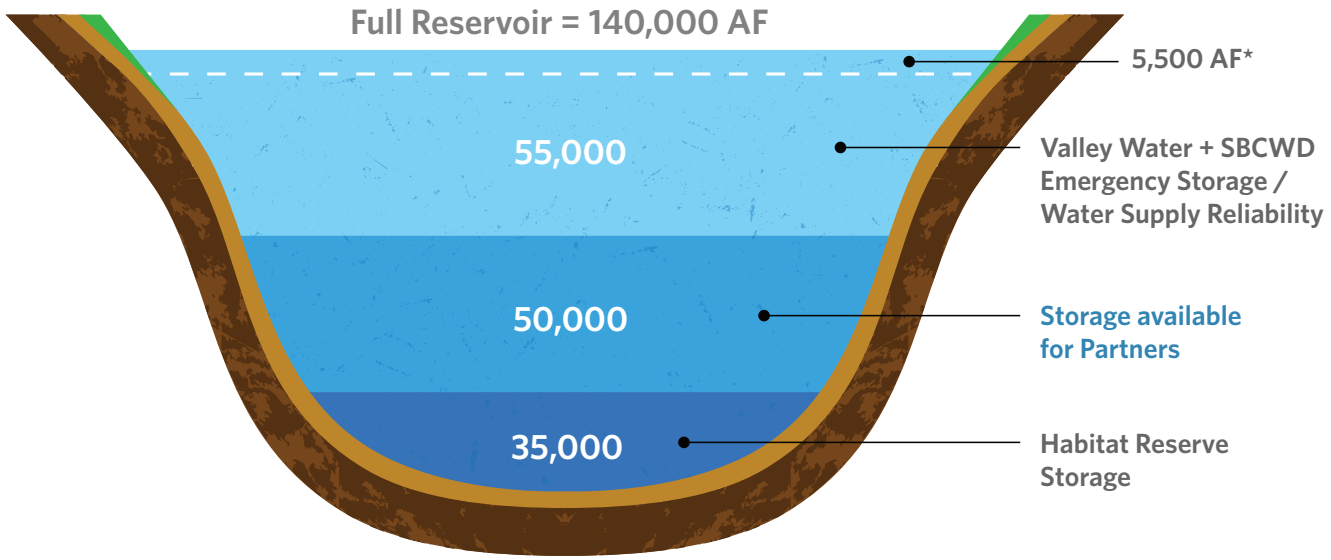
Adds valuable storage that is needed to manage increased variability of supply due to climate change.

PARTNERSHIP STORAGE

New project partners will have the opportunity to fully utilize their dedicated share of up to 50,000 acre-feet (AF) of storage capacity. The primary path for a partner agency to place water in the expanded Pacheco Reservoir will be through San Luis Reservoir. For example, water from a project partner may be placed in Pacheco Reservoir directly or by exchange with Valley Water, and this water may later be withdrawn from the reservoir by exchange.

The San Benito County Water District (SBCWD) is an existing partner with an allocation of up to 10% of the reservoir capacity. The Pacheco Pass Water District is also an existing partner with the rights to receive storage consistent with its water rights.

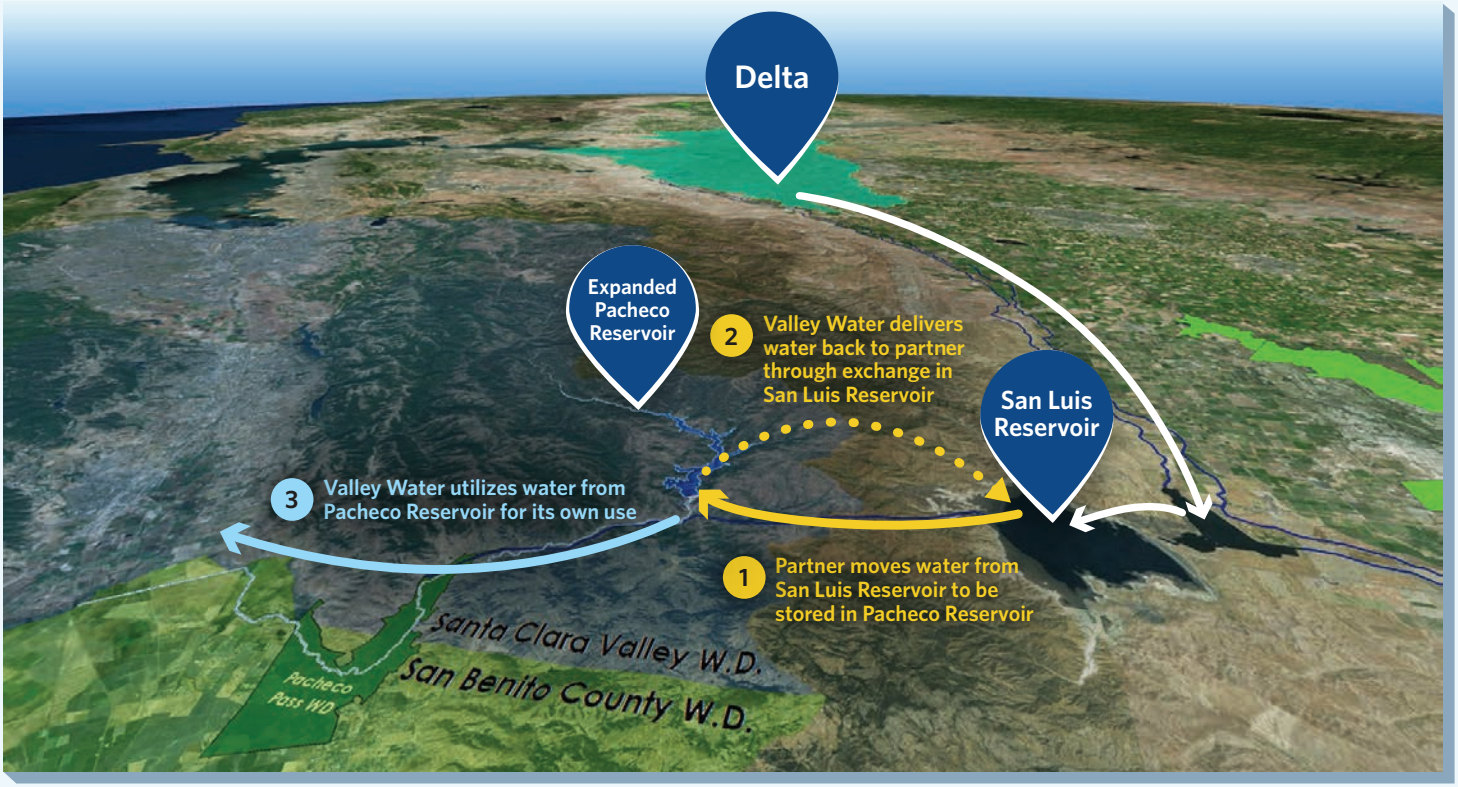
Example of Partnership Storage



* 5,500 AF storage space reserved Nov. 1 for natural inflow only

PARTNERSHIP PROJECT OPERATION

Example of Project Operations



All modes of conveyance and exchange will require discussion and approvals of other agencies including potentially the Bureau of Reclamation and or the Department of Water Resources:

- Partners will have rights to utilize all their designated storage capacity for the benefit of their customers/landowners.
- Since the flow of imported water into Pacheco Reservoir is always via the Federal/State San Luis Reservoir, partners may source their inbound water by exchange with Valley Water.
- Partners who are Central Valley Project (CVP) or State Water Project (SWP) contractors would receive in future years, by exchange, a portion of Valley Water's CVP/SWP allocations.
- Bay Area Regional partners may bring in their source water via San Luis Reservoir, involving use of federal/state facilities, and pumped into Pacheco Reservoir. In this case, partner arrangements for wheeling their inbound water would be made with the Bureau of Reclamation, (potentially) the California Department of Water Resources, and Valley Water. Partnership withdrawals of water would be facilitated by Valley Water and wheeled though the San Felipe pipeline and Valley Water's pipelines for delivery to their system or may be exchanged for Valley Water's CVP or SWP water.
- Alternatively, Bay Area regional partners may explore with Valley Water other ways of exchanging water involving Pacheco Reservoir storage.

PARTNERSHIP COST

	Environmental Reserve (WSIP)[1]	Valley Water and San Benito County Water District	Partners	Total
Reservoir Reserved Volume *(acre-feet, AF)*	35,000 AF	55,000[2] AF	**50,000 AF**	140,000 AF
Capital Cost	$ 0.5 billion[2]	$ 1.1 billion[3]	**$ 0.9 billion**	$ 2.5 billion
Capital Cost *(% of Total)*	20%	44%	**36%**	100%
Annual O&M Cost[4] *(%million/year, 2030*	-	$ 2.6 million/year	**$ 2.4 million/year**	$ 5.0 million/year

1 Water Storage Investment Program

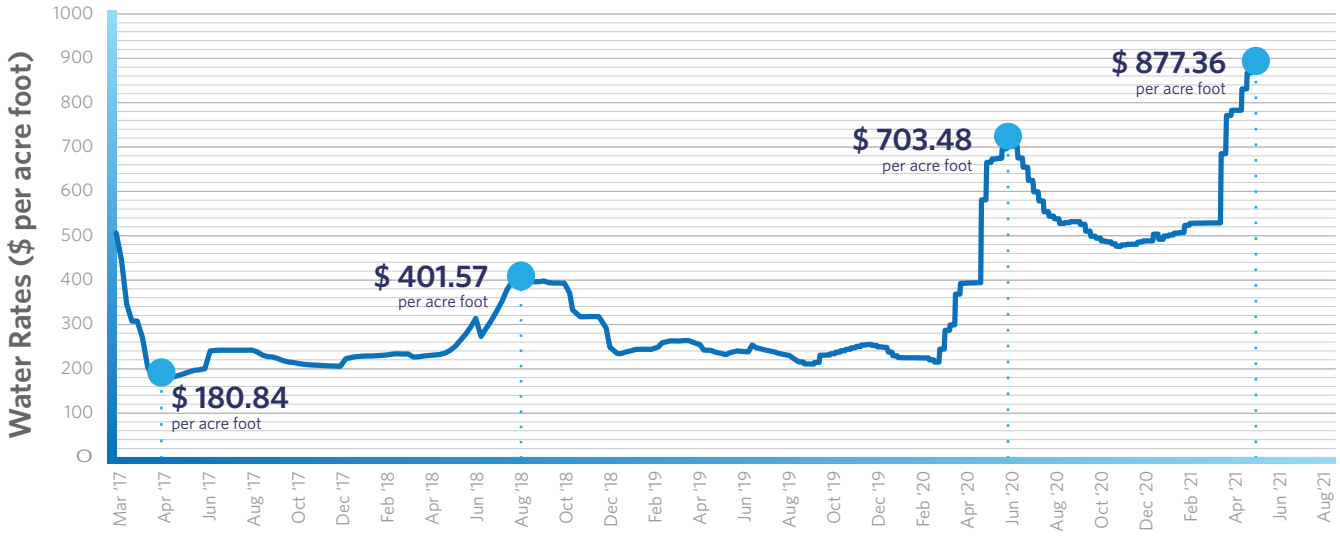
2 Includes payment for emergency storage benefits (Valley Water).

3 Will increase if Partnership commitment is less than 50,000 acre-feet.

4 Transfer costs and evaporation losses are not included in this estimate.

THE COST OF WATER

Climate change is expected to result in more severe droughts, impacting our state's water supply. When supply is low, the cost to purchase water skyrockets. Investing in the Pacheco Reservoir Expansion Project will help Valley Water and project partners secure an accessible emergency supply for future droughts.



Index that benchmarks the spot price of water in California. Source: *www.nasdaq.com/solutions/nasdaq-veles-water-index*

PROJECT FUNDING

Valley Water, the Pacheco Pass Water District and the San Benito County Water District collaborated to secure $496.65 million in funding from California's Proposition 1 Water Quality, Supply and Infrastructure Improvement Act of 2014. The Act, passed by California voters, provides for $7.5 billion in general obligation bonds, including $2.7 billion for investments in surface and groundwater storage projects. The Prop 1 funding was conditionally approved in July 2018.

The current estimated cost of the project is $2.5 billion. Valley Water will make up to 50,000 acre-feet of storage space in the reservoir available to its partners at an equivalent cost participation level. For example, a project partner could secure 50,000 acre-feet, or 36% of the total storage, at 36% of the project cost consistent with the table above.

PROJECT TIMELINE

Valley Water is continuing to conduct investigations and surveys to design and evaluate feasibility and potential environmental impacts. Construction is anticipated to begin in 2025. Preliminary estimates indicate construction of the Pacheco Reservoir Expansion Project will take at least five years.

All years referenced on the dashed line are schedule estimates.

Contact Us

To get more information about this partnership opportunity, contact **Chris Hakes**, Deputy Operating Officer of Valley Water's Dam Safety & Capital Delivery Division at ***chakes@valleywater.org*** or at **(408) 630-3796**.

Valley Water

Clean Water • Healthy Environment • Flood Protection

San Benito County Water District

PPWD Pacheco Pass Water District

In the fall of 2019, Valley Water performed exploratory drilling to gather information about the soil and rock characteristics needed for the project design.

PACHECO RESERVOIR EXPANSION PROJECT

www.valleywater.org/project-updates/pacheco-reservoir-expansion-project

CENTRAL COAST WATER AUTHORITY

MEMORANDUM

January 4, 2024

TO: CCWA Operating Committee

FROM: John Brady
Deputy Director, Operations and Engineering

SUBJECT: Santa Ynez II Long-Term Project Overview

A portion of the CCWA pipeline from the Santa Ynez Pumping Plant and Lake Cachuma was constructed in the 1960's within the Santa Ynez Riverbed (Reach SYII). Prior to CCWA purchasing this portion of the pipeline in the mid-1990's, an assessment of the pipeline's remaining service life was completed and the assessment suggested a remaining service life of approximately 20 years. CCWA staff have been closely monitoring the condition of the pipeline and have not observed any significant issues with the pipeline. However, due to the pipeline exceeding the 20-year service life that was estimated prior to acquisition of the pipeline, a long-term plan is needed for Reach SYII. Any project to replace this section of the pipeline will involve significant time and effort to fund, permit, design and construct. This project will begin the development of a long-term plan so that the pipeline can be replaced in the most cost-effective manner and allow time to arrange for financing, environmental review, design and permitting.

Another consideration for the long-term plan for reach SYII is the current use of a high density polyethylene (HDPE) pipeline that was installed to specifically by-pass the Bradbury Dam Penstock, which is the original delivery point for CCWA water. This project will also include planning for replacing this temporary pipeline with a permanent bypass pipeline as the first of multiple phases of the Reach SYII replacement project. An additional aim of the project is to be in position to take advantage of the US Bureau of Reclamation plan to install a pipeline across the Stilling Basin. It is contemplated that CCWA will combine efforts with the Bureau to build a CCWA pipeline alongside the Bureau's pipeline across the Stilling Basin as well.

The attached proposals outline the scope of work by CCWA's engineering consultant, HDR Engineering, and environmental consultant, Stantec, in carrying out the preliminary long-term plan.

Attachments

December 6, 2023

Mr. John Brady
Engineering Manager
Central Coast Water Authority

Via email: jlb@ccwa.com

Subject: Bradbury Dam Permanent Bypass Pipeline – Conceptual Study

Dear John,

HDR is pleased to provide this proposal to investigate upgrades to the CCWA pipeline that currently delivers water to Lake Cachuma.

The existing pipeline leading to Lake Cachuma is approximately 60 years old, is subject to erosion damage, and is difficult to access. At the Bradbury Dam, an above-grade bypass pipeline has been installed which is high-risk and high-maintenance. This study will provide the bases for a program of upgrades to replace this critical pipeline with facilities that meet the needs of CCWA, its member agencies, and other stakeholders. With subconsultant Stantec Consulting Services, the study will investigate the alignment, determine environmental and permitting issues, and provide planning-level estimates of cost and schedule. The study will be performed under the terms and conditions of our annual agreement, with a not-to-exceed budget per the attached Fee Estimate. A detailed scope of work for this study is attached.

HDR appreciates the opportunity to provide a proposal for this very important study. If there are any questions about this proposal, please don't hesitate to contact Dan Ellison or John Coffman.

Sincerely,
HDR Engineering, Inc.

Anna Lantin, PE
Vice President

Dan Ellison, PE
Project Manager

Enclosures: Scope, Fee Estimate

Copy w/enc: John Coffman

Bradbury Dam Permanent Bypass Pipeline – Conceptual Study

Study Objective: Develop a conceptual design for a permanent pipeline for delivering State Water Project water from Central Coast Water Authority (CCWA) to Lake Cachuma, without the use of the Bradbury Dam penstock and the Santa Ynez Distribution Pipeline.

Currently, CCWA relies on the Santa Ynez Distribution Pipeline for delivering water to the lake. There are several concerns and problems associated with this existing pipeline:

(1) The pipeline is approximately 60 years old, constructed in the early 1960s.

(2) The pipeline was designed to deliver gravity-flows from the lake. Delivering pumped-flows to the lake requires higher pressures and potentially more pressure cycles.

(3) The pipeline is adjacent to the Santa Ynez River, which has historically exposed and damaged the pipeline during high-flow events.

(4) The river channel is habit for steelhead trout and other sensitive species. Any work to repair or "harden" the pipeline along the river requires the approvals of multiple agencies.

(5) The pipeline is on privately owned property and not easily accessed.

(6) A portion of the pipeline near and below Bradbury Dam can no longer be used by CCWA, because flows from the lake to the Hilton Creek fishery take precedence. This has forced CCWA to install a problematic, above-grade bypass pipeline.

The current concept for the bypass pipeline is shown (in blue) in Figure 1 and involves 5.3 miles of pipeline constructed in three phases. The first phase of work would involve a short segment with a channel crossing to be constructed in coordination with Bureau of Reclamation work. Much of the bypass pipeline would be constructed within the SR 154 right of way.

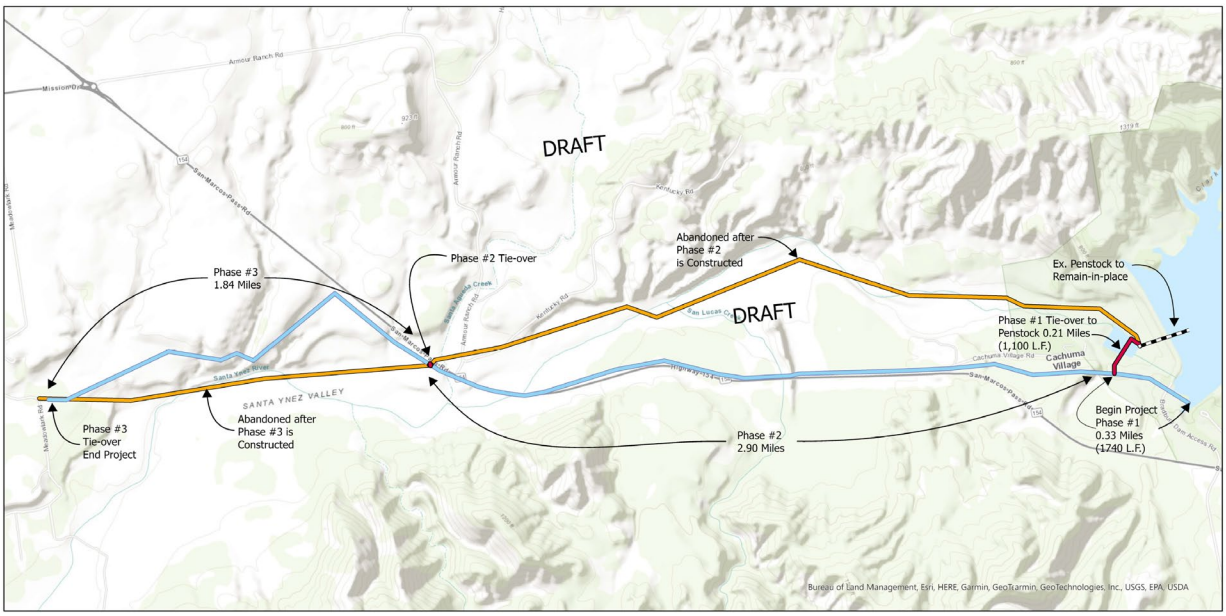


Figure 1: Concept of Bradbury Dam Permanent Bypass Pipeline

hdrinc.com 200 E Santa Clara St, Suite 220, Ventura, CA 93001-2795
(805) 665-6353

Scope of Services

HDR will perform the following services:

1. Project Administration. HDR will perform general project management and coordination activities, including quality-control documentation, invoicing, and project communications / coordination.
2. Workshops. HDR will facilitate and lead the following meetings. These meetings will be held at CCWA headquarters in Buellton.
    a. Kickoff / Site Review
    b. Working group: CCWA, Bureau of Reclamation, South Coast member agencies, and COMB

    Deliverables: Meeting agenda and minutes for the above two meetings
3. Project Report.
    a. Report objectives. HDR will prepare a report that describes:
        - General pipeline alignment
        - Project phasing
        - Methods of construction
        - Permits required
        - CEQA / NEPA requirements
        - Locations where private easements are needed
        - Planning-level cost opinion
        - Planning-level schedule of activities
    b. Pipeline alignment and hydraulic profile. The pipeline alignment will be generally depicted using graphics and information readily available from Google Earth, Google Street View, CCWA GIS (geographical information system), and consultant team GIS files. County Assessor parcel mapping will be used to provide general right-of-way information. Topographic or right-of-way mapping by a licensed surveyor will not be performed at this time. Up to two alignment alternatives will be studied.
    c. Environmental screening study. HDR will engage the services of Stantec Consulting Services, Inc., to assist with Environmental Planning and Permit Screening. Stantec will participate in workshops and perform other services as described in Attachment 2. Stantec will provide a letter report which will be attached to HDR's report. Stantec's report will address:
        i. Known or expected environmental constraints likely to affect CEQA and NEPA
        ii. Anticipated environmental permitting requirements.

d. Other permits. HDR will describe other anticipated permits, based on the "Working Group" workshop discussions, a meeting with Caltrans District 5, and its own experience with similar projects.

e. Utility Research. Evidence of buried and overhead utilities will be observed and documented in the notes and photos of the site review. Additionally, HDR will contact Underground Service Alert and request a list of registered utilities along the alignment. HDR will then request drawings and other information from each registered utility and will maintain a log of responses. Where a utility does not respond, HDR will follow up with one email or phone call. Utilities will be described in the report but will not be mapped at this time. If a utility charges a fee, CCWA will provide direct payment or authorize an increase in HDR's budget.

f. Construction conditions, methods, and opinion of cost. HDR will describe the anticipated methods of construction and anticipated site conditions based on the previous reports and documents furnished by CCWA and other working group members, and HDR's observations during the Site Review. The services of a geotechnical engineer or geologist are not included at this time. HDR will prepare a planning-level (Class V) Opinion of Probable Construction Cost for the selected alternative only.

4. Deliverables (Draft Report / Final Report) and Review Meeting. HDR will prepare a brief report (approximately 15 to 20 pages, excluding appendices) summarizing its findings and recommendations. HDR will facilitate a virtual meeting with CCWA (and others invited by CCWA) to discuss the draft report and comments. A final report will be prepared approximately 2 to 4 weeks after the review meeting and all comments have been received.

Schedule

Work will be performed in general accordance with the following schedule.

Activity	When
Kickoff Meeting / Site Review	Early January, 2024
Working Group Workshop	Early February, 2024
Draft Environmental Screening Report	Early March, 2024
Draft Project Report	Late March, 2024
Review Meeting	April 2024
Final Report	Late April, 2024

Exclusions

1. Biological, Archeology, Paleontology, Traffic, or Utility Surveys
2. Topographic or right-of-way survey
3. Geotechnical studies
4. Professional Cost Estimating Services
5. Title Report review or the securing of title reports

6. Studies associated with Hilton Creek water deliveries or work associated with the Bureau of Reclamation Projects

Terms and Conditions

The work will be performed as a task order, in accordance with the terms and conditions of HDR's master agreement with CCWA. The fee shown in the attached Fee Estimate will not be exceeded, unless authorized in writing by CCWA.

Attachments

(1) HDR Fee Estimate
(2) Stantec Proposal

Central Coast Water Authority
Bradbury Penstock Bypass Study
Estimated Level of Effort and Fee

TASKS		LEVEL OF EFFORT								FEE				
No.	Description	Sr. Professional Associate	Sr. Project Manager	EIT	CADD Manager	Sr CADD Designer	Project Coordinator	Accountant	Total Labor	Labor	Subs	Direct Costs	Total	TOTAL
	Client Billing Rates	*$394*	*$365*	*$149*	*$205*	*$171*	*$126*	*$217*	*$269*		*Calc*	*Calc*	*Calc*	*-1*
	Task Name													
1	Project Administration	4					8	9	21	$4,541	$0	$68	$4,609	
2	Workshops	14	9	8					31	$9,994	$0	$150	$10,144	
3	Report	26		28	9	14	3		80	$19,029	$41,365	$285	$60,679	
4	Deliverables and Review Meeting	9	9						18	$6,832	$0	$102	$6,934	
	Subtotal | Task Name	**53**	**18**	**36**	**9**	**14**	**11**	**9**	**150**	**$40,397**	**$41,365**	**$605**	**$82,366**	**$82,370**
TOTAL, hours		**53**	**18**	**36**	**9**	**14**	**11**	**9**	**150**					
TOTAL, dollars										**$40,397**	**$41,365**	**$605**	**$82,366**	**$82,370**

November 8, 2023 **SENT VIA E-MAIL**

201 North Calle Cesar Chavez
Suite 203
Santa Barbara, CA 93103
USA

Phone +1 805 962 7679
Fax +1 805 963 0412

www.stantec.com

Dan Ellison
200 East Santa Clara Street, Suite 220
Ventura, CA 93001

RE: Prepare Screening Study for Replacement Pipeline from Bradbury Dam to Meadowlark Lane

Dear Mr. Ellison:

Stantec Consulting Services Inc. (Stantec) is pleased to provide this scope of work and budget to prepare a screening-level study for a replacement pipeline for the ID#1 pipeline that runs from Bradbury Dam to Meadowlark Lane in Santa Barbara County, California. This proposal describes our scope of work, assumptions, staffing, and cost estimate.

Scope of Work

Stantec is proposing to conduct this work in six tasks as described below.

Task 1 – Kick Off Meeting and Site Walk

Stantec will attend a virtual kick off meeting and an in-person site walk. The purpose of the site walk will be to gain a better understanding of the environmental and construction constraints and the purpose of the kick off meeting will be to discuss the project and potential alternatives.

Task 2 – Work Group Meeting

Stantec leads for environmental and planning will attend a workshop with the Bureau of Reclamation, the Cachuma Operations and Maintenance Board, and south coast member agencies to discuss the project.

Task 3 – California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA) Review

Stantec will provide a review of known or expected environmental constraints that are likely to affect or limit the project. Location-specific constraints will be shown on strip maps and general information will be discussed in a report. Key resources for the CEQA/NEPA review are expected to be in the following categories:

- Traffic – Project construction along Highway 154 will require lane closures and nighttime work, with some work during off-peak hours (8:00 am to 4:00 pm). Stantec will consult with the California Department of Transportation (Caltrans) to identify impacts on State Routes and public/private road connection based on the alignment, staging requirements, and construction traffic demand.

  The review will provide an overview of traffic related impacts and a general description of mitigation such as temporary lane closures, work hours, and other measures to mitigate construction delays along each pipeline segment.

- Air Quality – Air quality and greenhouse emissions will be generated during project construction. Stantec will provide an overview of the Santa Barbara County Air Pollution Control District Environmental Review Guidelines. A general discussion will include types of mitigation to reduce air quality and greenhouse gas emissions, such as equipment/vehicle type, use of water trucks, and construction worker trips.

- Biological Resources – Key biological concerns will be related to habitat (e.g., riparian, oak woodlands, native grasslands) and special status species (e.g., southern steelhead, California red-legged frog, and southern western pond turtle). We will review commonly available sources of desktop data including:

  - California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB)

- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) and National Hydrographic Dataset
- Regional and Local Wildlife/Habitat Connectivity Corridors
- USFWS critical habitat information
- Audubon Important Bird Areas
- Aerial photography
- County of Santa Barbara Environmentally Sensitive Habitat Areas

The review will provide an overview of the biological resources that will be impacted and a general description of the types of mitigation that will be required. Stantec will identify observable constraints from the desktop review and from the site visit on strip maps but will not delineate the boundaries of those constraints.

- Cultural Resources – Stantec will conduct a records search of the California Historical Resources Information System (CHRIS) to determine if there are known records of cultural resources in the project area. Stantec will review the grey literature and the CHRIS record search results and provide a brief description for the report.
- Utilities – Stantec will conduct a review of existing utilities along the proposed pipeline alignment. Stantec will conduct a Dig Alert request and query utility providers. Knowledge of existing utilities will assist in placement and construction of the proposed pipeline. The utilities analysis will also assist in potential construction alternatives for the segment crossing the Santa Ynez River.

Task 4 – Permitting Review

Stantec will provide information about the permitting required and some strategic recommendations. This review will cover permits from the following agencies of the following types:

- U.S. Army Corps of Engineers (USACE) – depending on how creek and river crossings are achieved, a permit will likely be required from the USACE. The report will address various permitting pathways and how they may affect other permits needed by the project.
- Regional Water Quality Control Board (RWQCB) – Stantec will provide a review of the wetlands and waters permitting that will be required by the RWQCB.
- CDFW - Stantec will provide a review of permits required and the constraints and strategies for CDFW in two categories: endangered/special-status species and state wetlands/ waters. We will provide information on the known and likely occurrence of special-status species and provide information on the probable locations for state wetlands and waters. We will provide information on the requirements to avoid needing permits (if applicable) and the pros and cons of doing so.
- United States Fish and Wildlife Service (USFWS) – Stantec will review requirements in two categories: endangered/special-status species and nesting bird avoidance. We will provide information on the known and likely occurrence of special-status species and provide information on requirements for avoiding nesting birds. We will also provide strategies to limit the impacts of nesting birds on construction schedules. We will provide information on the requirements to avoid needing permits (if applicable) and the pros and cons of doing so.
- State Historic Preservation Office – Stantec will provide a brief statement concerning consultation that could be required.

Finally, the permitting review will compare options for each permit and how those options interact with other permits. For example, it may be beneficial to need a permit from USACE because then there is a lead federal agency to consult with USFWS. But if Reclamation or some other federal agencies is involved, the benefit of needing permitting with the USACE may not be applicable.

Task 5 – Alternatives Review

Stantec will review up to 2 alternative alignments or construction methods and provide a table which will compare if those alternatives would result in greater CEQA/NEPA impacts for each of the categories listed above and will also compare if those alternatives would result in more challenging permitting for each of the permit types outlined above.

Assumptions

The scope and costs provided in this proposal where prepared with the understanding described above as well as the following assumptions:

- The report will be brief; this is intended to be a screening-level study that will not necessarily identify all potential issues that may require more in-depth analysis or study.
- The cost of the CHRIS records search will not exceed $2,000.
- Stantec will not provide permitting review for stormwater permits.
- Due to the screening-level desired at this phase, Stantec anticipates that each topic will be addressed in a relatively short entry, one or two paragraphs in length, as well as shown on strip maps (if applicable).
- No biological surveys are proposed as part of this effort.

Any project changes after the initial analyses and reports are prepared that change the analysis are not included in the scope of work and will require additional budget.

Staffing and Schedule

Tamara Klug will oversee the work and work closely with the research team to maximize efficiency and quality, oversee the write up for biological resources and permitting. Crystahl Taylor will oversee the CEQA/NEPA analysis and description. We will initiate work with receipt of a signed contract. The schedule for site visits and meetings will be determined mutually with you and the schedule for the deliverable is anticipated to be in the first half of 2024, but will be refined during the project.

Cost Estimate

The estimated cost for this effort is **$39,394.69** as shown below, which is based on the Stantec schedule of fees for the Central Coast Water Authority (CCWA).

Thank you very much for the opportunity to continue to work with you.

Sincerely,

Tamara Klug

Senior Principal

Direct Line: 805 979 9412

Email: tamara.klug @cardno.com

cc: Lori Browning, Stantec

FEE ESTIMATE - CCWA -screening level study for Santa Ynez

Name	Klug, Tamara	Taylor, Crystahl	Glowacki, Stan	Thompson,	Davies, Evan	Lee, Tim	Nyberg, Katelyn	Meyers, Leah	Ballmer, Lisel	Nixon, Rachael	Kerridge, Ben	Tovey, Kate	Fah, Lauren	Lammers, Dennis	Heck, Kaitlyn	Tammar, Becky	Law, Danny	Antal, Anastasia	mileage	archaeology records search
Project Billing Rate (T&M)	$285	$250	$235	$235	$160	$115	$160	$115	$125	$285	$135	$115	$160	$220	$220	$145	$125	$115	$0.72	$1.10
Total Units (T&M)	$32	$14	$6	$6	$22	$7	$4	$4	$8	$12	$8	$16	$12	$16	$4	$4	$12	$4	180.00	$2,000
Fee (T&M)	$9,120	$3,500	$1,410	$1,410	$3,520	$805	$640	$460	$1,000	$3,420	$1,080	$1,840	$1,920	$3,520	$880	$580	$1,500	$460	$129.69	$2,200
Escalation (T&M)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0.00	$0
Total Fee (T&M)	$9,120	$3,500	$1,410	$1,410	$3,520	$805	$640	$460	$1,000	$3,420	$1,080	$1,840	$1,920	$3,520	$880	$580	$1,500	$460	$129.69	$2,200

Project Summary	Hours	Labour	Expense	Total
Fixed Fee	0.00	$0.00	$0.00	**$0.00**
Time & Material	191.00	$37,065.00	$2,329.69	**$39,394.69**
Total	191.00	$37,065.00	$2,329.69	**$39,394.69**

WBS Code	Task Name	Units																			Task Type	Hours	Labour	Expense	Total
1																					Time & Materia	191.00	$37,065.00	$2,329.69	$39,394.69
1.1	Site walk/kickoff meeting	8	2																4	60	Time & Material	14.00	$3,240.00	$43.23	$3,283.23
1.2	Work group meeting with Reclamation, South Coast Member	4	4																	120	Time & Material	8.00	$2,140.00	$86.46	$2,226.46
1.3	CEQA/NEPA Considerations	4	8							8	6	6	16	12	16	4	4	12			Time & Material	96.00	$16,900.00	$0.00	$16,900.00
1.4	Permitting Considerations	10		4	4	10	6	4	4		4									2,000	Time & Material	46.00	$9,260.00	$2,200.00	$11,460.00
1.5	Alternatives Review	6		2	2	12	1				2	2									Time & Material	27.00	$5,525.00	$0.00	$5,525.00

Stantec

CCWA Budget Planning Schedule
FY 2024/25 Budget

January

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

February

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29		

March

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13		15	16
17	18	19	20	21	22	23
24	25	26	27		29	30
31						

April

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24		26	27
28	29	30				

May

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

July

S	M	T	W	T	F	S
		2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

	Receive DWR Statement of Charges (for following calendar year)	July 1, 2023
	Prepare Draft Budget	November 1, 2023- February 29, 2024
	Submit Preliminary Budget to Operating Committee	March 14, 2024
	Submit Preliminary Budget to Board of Directors	March 28, 2024
	Board Approval of Final Budget	April 25, 2024
	Beginning of 2024/25 Budget Expenditure Cycle	July 1, 2024

Agenda Item V.G.
Operating Committee
January 11, 2024

Agenda Item V.H.
Operating Committee
January 11, 2024

THE ECONOMY OF THE STATE WATER PROJECT

Clean, Reliable, and Affordable Water for California

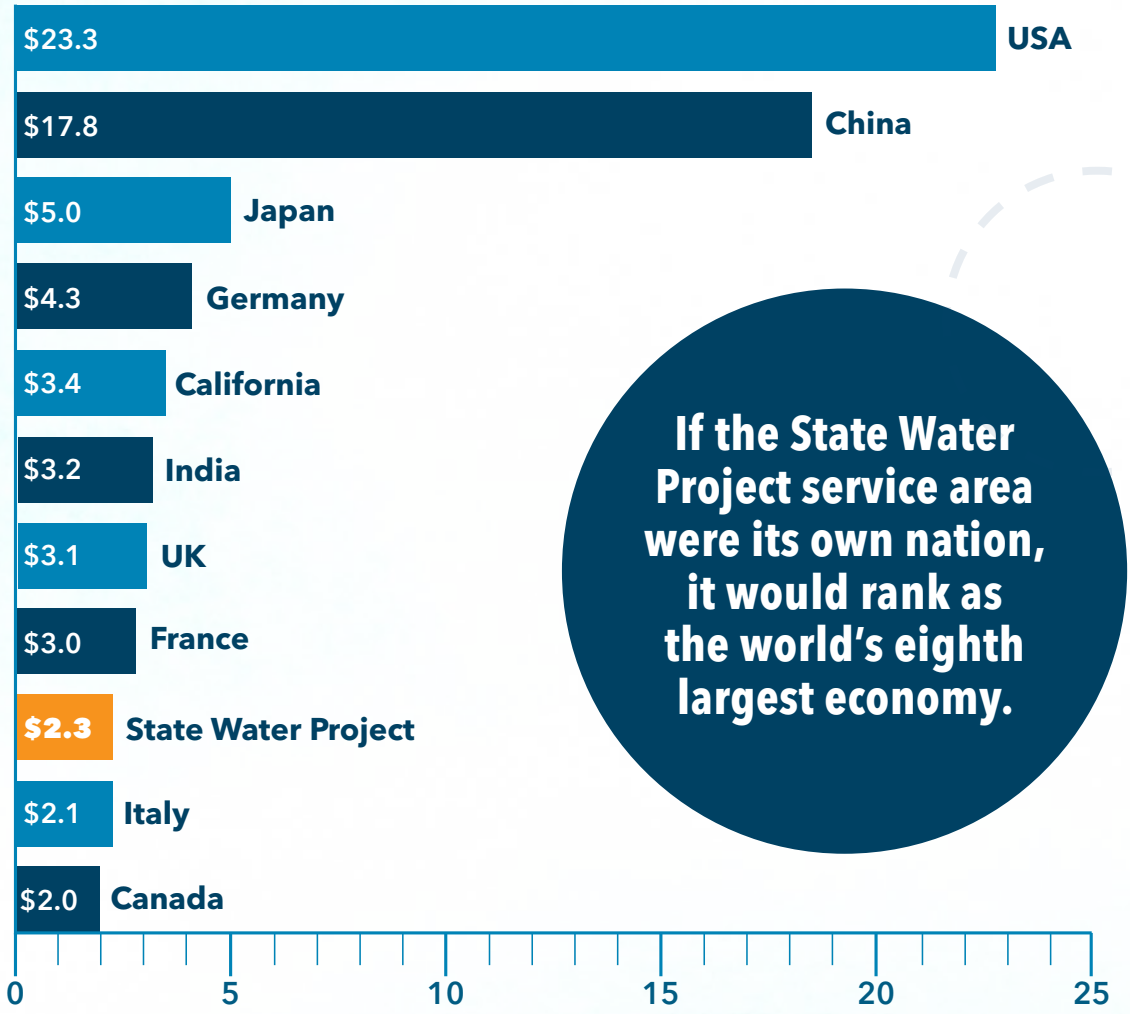
DEPARTMENT OF WATER RESOURCES • STATE OF CALIFORNIA •

The California State Water Project

is part of the backbone of California's water infrastructure – a multibenefit project that provides water supply, protects against floods, generates clean hydropower, offers recreational opportunities, provides environmental benefits, and drives California's economy - the fifth largest in the world.

The State Water Project is among the world's largest water management projects, featuring a 705-mile-long network of canals, dams, reservoirs, hydropower plants, and pumping plants that interconnect to supply water to over 27 million residents and irrigate 750,000 acres of farmland.

For the last 60 years the State Water Project's clean, reliable, and affordable water has fueled the growth of California's economy and population. The State Water Project's sustainable supply of water will become even more critical to the state's economy in the face of climate change impacts – according to California's Water Supply Strategy: Adapting to a Hotter, Drier Future, California faces a potential loss of 10% of its water supply by 2040.



If the State Water Project service area were its own nation, it would rank as the world's eighth largest economy.

Economy ranking bar chart

- The service area of the State Water Project is home to over 27 million individuals, over two-thirds of the state's population, and supports an economy with a Gross Domestic Product (GDP) surpassing $2.3 trillion. Its service area is the largest economy supported by a major water conveyance system anywhere in the United States, and the second largest anywhere in the world. Based on GDP, the State Water Project service area would be the world's eighth largest economy if it were its own nation. This economy supports the full-time employment of over 8.7 million individuals with jobs that pay 20% higher than the national average.

- The regions served by the State Water Project have experienced significant economic and population growth since the project was approved by voters in 1960. Since that time, the population in Southern California has more than doubled, nearly tripled in the Central Coast, South Bay, and North Bay, and more than tripled in the San Joaquin Valley. Property in the State Water Project service area is valued at a total of over $4.26 trillion.

The State Water Project supports an economy that provides 8.7 million full-time jobs.

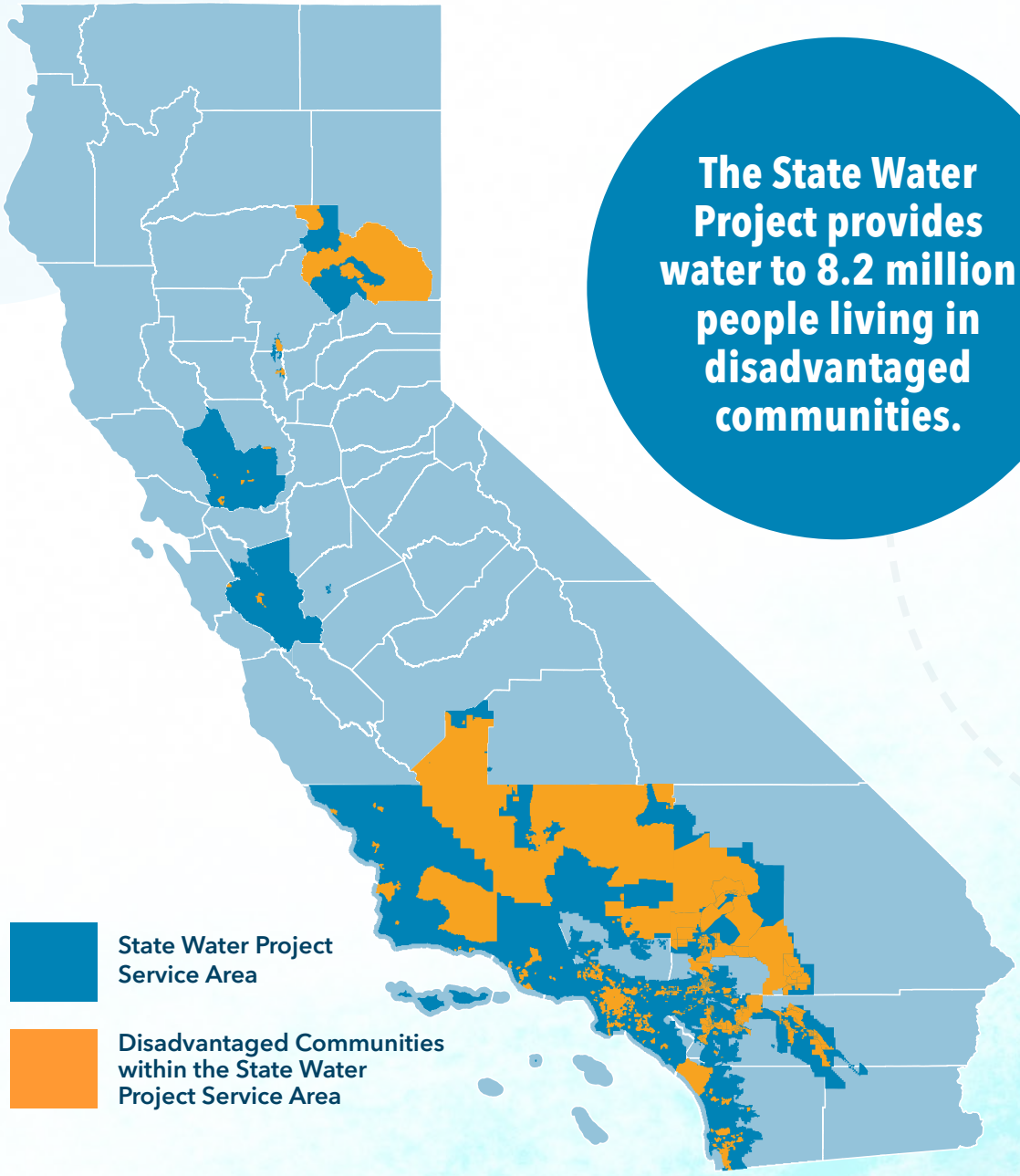
- The State Water Project supports an economy that provides 8.7 million full-time jobs, contains 800,000 businesses, and employs 160,000 farmworkers.

- Median household income has grown in all regions served by the State Water Project since 1960. Household income increased by 25% in rural regions where most State Water Project water goes to agricultural production, including in the Feather River and San Joaquin Valley regions. The State Water Project service area employs around 160,000 farmworkers mainly in these regions.

- The regions where the State Water Project provides water for mainly urban use, including the North Bay and Southern California, saw median household income increases exceeding 50 percent. The Central Coast more than doubled its household income. The South Bay saw the largest growth in median household income at over 150 percent.

 "The Economy of the State Water Project," Chapter III

The State Water Project provides water to 8.2 million people living in disadvantaged communities.

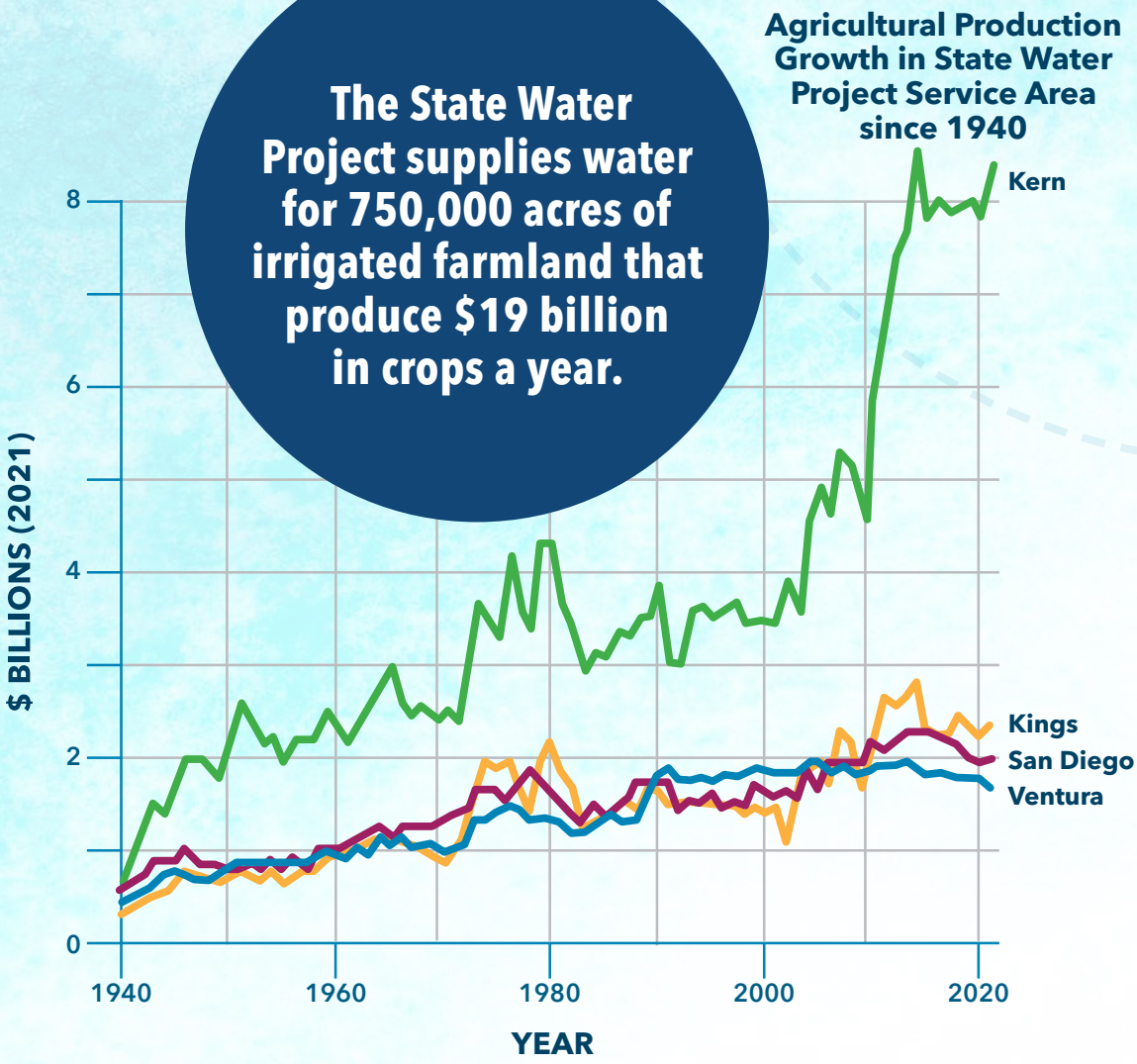


Map shows disadvantaged communities within State Water Project Service Area

- Water is a fundamental resource, and access to it is essential for various aspects of life, including health, sanitation, and economic opportunities. California law recognizes the human right to water, ensuring safe, clean, affordable, and accessible water for all Californians. Many communities still encounter challenges in securing a safe water supply due to social, economic, health, and environmental factors.

- State Water Project deliveries play a crucial role in upholding access to water for disadvantaged individuals and communities. The State Water Project provides water to almost three-quarters of California's population living in disadvantaged communities. Almost one-third of the individuals living in the State Water Project's service area are residents of a disadvantaged community.

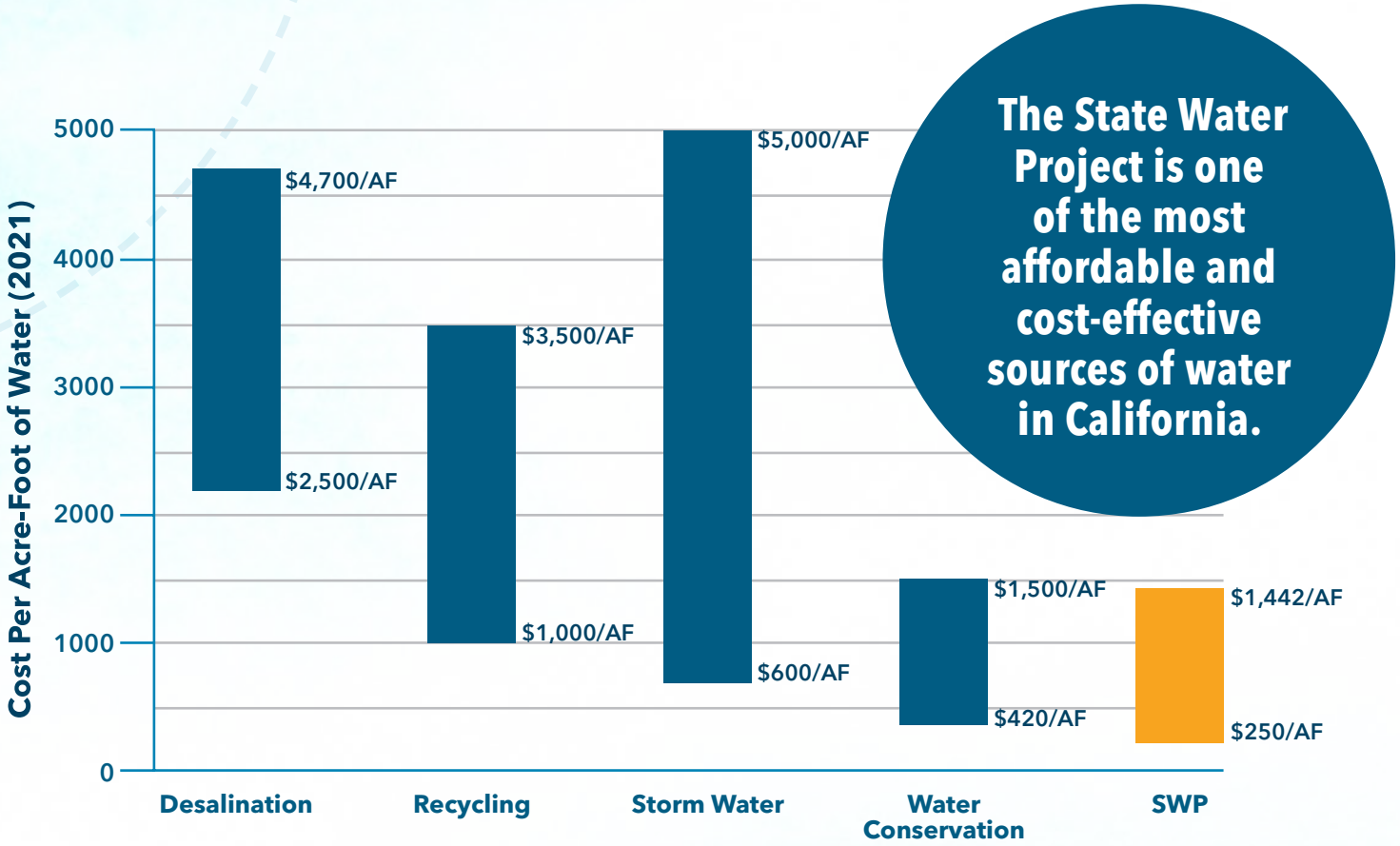
The State Water Project supplies water for 750,000 acres of irrigated farmland that produce $19 billion in crops a year.



- The State Water Project plays a pivotal role in sustaining California's agricultural economy, and the sector's reliance on State Water Project water is a key driver of economic activity, job creation, and income generation across the state.

- **The total value of agricultural production in regions served by the State Water Project exceeds $19 billion a year.** Kern, Kings, San Diego, and Ventura Counties receive 93 percent of all agricultural State Water Project deliveries. The value of agricultural production in regions served by the State Water Project has almost doubled since then in Kings, San Diego, and Ventura counties, and has more than tripled in Kern County.

- The State Water Project provides water for a diverse variety of crops and agricultural enterprises, including table grapes, oranges, tangerines, pistachios, almonds, cotton, dairies and cattle ranches in the San Joaquin Valley. In coastal areas such as San Diego and Ventura Counties, the State Water Project supplies water for crops including raspberries, avocados, nursery crops, and vegetables.



The Cost of Alternatives to the State Water Project

- The State Water Project stands out as one of the most affordable sources of water in California and is more cost-effective compared to alternative sources. The project's commitment to cost-effectiveness has significant implications for the accessibility and affordability of water across the state. The average cost of delivering State Water Project water ranges between $250 per acre-foot in the San Joaquin Valley, to $600 per acre-foot in Southern California and as high as $1,440 per acre-foot on the Central Coast.

- Compared to alternatives like water recycling programs ($2,200 per acre-foot median cost) and seawater desalination facilities ($2,800 per acre-foot median cost), the State Water Project is a more economically efficient option. All sources of water remain essential for adapting to a hotter, drier future as outlined in the California Water Supply Strategy.

- While some common water conservation programs – such as installing high efficiency toilets and washers – may have lower costs compared to State Water Project water, their lack of scalability prevents them from replacing a substantial volume of State Water Project water deliveries.

Photos – cover: State Water Project water flows through the Sacramento River towards the Delta; inside cover: Lake Oroville is the largest State Water Project reservoir. above: Lake Perris in Riverside County is the southernmost State Water Project reservoir.

Research conducted by the Berkeley Research Group, a global consulting firm working collaboratively with the California Department of Water Resources.

12/23

THE ECONOMY OF THE STATE WATER PROJECT

Clean, Reliable, and Affordable Water for California

Prepared by: David Sunding, Ph.D., Oliver Browne, Ph.D., and Zhaolong Jerry Zhu

BRG
Berkeley Research Group

DEPARTMENT OF WATER RESOURCES • STATE OF CALIFORNIA •

December 14, 2023

Table of Contents

Executive Summary 2
I. Introduction 5
II. Water Use in the State Water Project Service Area 7
III. The Urban Economy of the State Water Project 11
IV. The Agricultural Economy of the State Water Project 20
V. Underrepresented Communities Served by the State Water Project 22
VI. The Costs of State Water Project Deliveries and Alternative Supplies 26

Figures

Figure 1: Water Use in the State Water Project Service Area 8
Figure 2: History of State Water Project Maximum Contractual Table A Allocations by Service Area (1962-2021) 10
Figure 3: History of State Water Project Deliveries by Service Area (1962-2021) 11
Figure 4: Population Growth in the State Water Project Service Area (1940 – 2021) 14
Figure 5: Median Household Income Growth in the State Water Project Service Area (1960 – 2021) 15
Figure 6: Breakdown of Urban Water Use by Sector 16
Figure 7: If the State Water Project Service Area Were a Country, it Would Be the World's 8th Largest Economy 17
Figure 8: Agricultural Production in Counties with Significant State Water Project Water Use in Agriculture 22
Figure 9: DAC Communities in the State Water Project Service Area 24
Figure 10: The Cost of Developing Alternative Water Supplies to the State Water Project 29

Tables

Table 1: Urban Water Use in the State Water Project Service Area 13
Table 2: Comparison of the State Water Project to Other Water Conveyance Projects in the USA 18
Table 3: Comparison of the State Water Project to Other International Water Conveyance Projects 20
Table 4: Agricultural Water Use in the State Water Project Service Area 21
Table 5: DAC Populations in the State Water Project Service Area 25

Executive Summary

The State Water Project (SWP) is among the world's most extensive water conveyance projects, featuring a 705-mile-long network of dams, reservoirs, hydroelectric facilities, pumping plants, and canals. The State Water Project plays a key role in the state's economy. It supplies over 27 million Californians, a majority of the state's population, along with commercial and industrial customers, including in the technology and manufacturing sectors, that account for a majority of the state's economic activity. Project deliveries also supply water to the agricultural sector, supporting the cultivation of fruits, vegetables, and nuts, particularly in the Central Valley, the nation's most productive agricultural region. This reliable water source not only ensures the livelihood of residents, businesses, and farmers but also contributes significantly to the state's economy through technology, manufacturing, and agricultural exports.

This report consolidates publicly available data from the California Department of Water Resources (DWR) and other agencies to provide policymakers with a comprehensive overview of the economy that is supported by the State Water Project. The aim is to present this information in a concise format to facilitate well-informed decision-making regarding the project. The information in this report covers patterns of water use in the State Water Project service area, the size of the urban and agricultural economies served by the State Water Project, the role of the State Water Project in serving underrepresented communities, and how the costs of State Water Project water deliveries compare to the costs of developing alternative water supplies.

Water from the State Water Project is delivered to twenty-nine contractors in six regions of California. These contractors are water agencies of varying sizes that fulfill diverse roles, including direct municipal water supply, wholesaling water to other local utilities and municipalities, and supplying water for irrigation and managing groundwater storage. Of the six regions supplied by the State Water Project, the two largest are Southern California, where 54% of State Water Project deliveries are used primarily in the urban sector, and the San Joaquin Valley, where 38% of State Water Project deliveries are used primarily in the agricultural sector. The remaining 8% of State Water Project deliveries are used in the Feather River Basin, the North and South Bay regions of the San Francisco Bay Area, and on the Central Coast in San Luis Obispo and Santa Barbara counties. Based on data on water use in California, 56.4% of total State Water Project deliveries are used by urban customers and 43.6% are used in agriculture. The State Water Project also delivers water for other beneficial uses, which are beyond the scope of this report.

Most State Water Project water deliveries are governed by contractual terms that set a maximum annual volume for each contractor, often referred to as Table A deliveries. During the year, the Department of Water Resources announces what percentage of contracted Table A volumes contractors can expect to receive. Allocations can shift significantly from one year to the next due to California's highly variable climate and hydrology. Over the past 20 years, contractors have received an average of 63% of their contracted Table A

volumes.[1] Besides Table A deliveries, contractors also receive two other types of deliveries; Carryover Water, which lets contractors store unused Table A allocations for later use, and Article 21 Water, which is additional water that is made available to contractors when export capacity exceeds both current demands and regulatory obligations.

The State Water Project service area is the largest economy supported by a major water conveyance system anywhere in the United States, and the second largest anywhere in the world. The service area of the State Water Project is home to over twenty-seven million individuals, over two-thirds of the state's population, and supports an economy with a Gross Domestic Product (GDP) surpassing $2.25 trillion. Based on GDP, the State Water Project service area would rank as the world's eighth-largest economy if it were an independent nation. This economy supports the full-time employment of over 8.7 million individuals with jobs that pay a median income 23% higher than the national average.[2]

The regions served by the State Water Project have experienced significant income and population growth since the project was approved by voters in 1960. Since that time, populations in the six regions served by the State Water Project have at least doubled and in some cases tripled. Today, property in the State Water Project service area is valued at a total of over $4.26 trillion.[3]

In Southern California, the State Water Project constitutes more than 28% of its urban water supply, surpassing the volume of water supplied by the regions other two major urban water conveyance systems: the Colorado Aqueduct at 23% and the Los Angeles Aqueduct at 14%.[4]

In Kern County, the State Water Project provides 24% of all water used in agriculture.[5] State Water Project supplies have been crucial to driving the county's growth in almond and pistachio production, which has led the real value of agricultural production in the county to more than double since the early 2000s to an annual value of $8.2 billion. The State Water Project water will play an increasingly vital role in Kern county's agricultural water supply as the region takes actions to comply with the Sustainable Groundwater Management Act (SGMA).

California Assembly Bill 685 (2012) recognizes the human right to water which guarantees the right to safe, clean, affordable, and accessible water for all Californians. However, many communities still face challenges accessing a safe water supply today due to social, economic, health, and environmental considerations. State Water Project deliveries uphold the right to water for a significant number of underrepresented people and communities. The term disadvantaged community (DAC) has differing definitions in state legislation, often

[1] See Section II.
[2] See Section III.
[3] See Section III.
[4] See Section III. Note that the All-American Canal conveys a larger volume of water to Southern California than the State Water Project, but this primarily serves the agricultural Imperial Valley.
[5] See Section IV.

relating to median household income (MHI) or health and environmental quality measures. Depending on the definition used, 6.6 to 8.2 million individuals reside in disadvantaged communities served by State Water Project water. This is between 65% and 75% of all disadvantaged communities in California and between 17% and 21% of the state's total population. Most of these residents live in Southern California, between 6.1 to 7.1 million, depending on the definition used. Disadvantaged communities served by the State Water Project in Southern California constitute between 56 and 70% of the state's total population of disadvantaged communities.[6] In the San Joaquin Valley, residents of DACs are disproportionately likely to be employed in farm jobs served with water from the State Water Project.

The cost of water deliveries to State Water Project contractors is determined by a water charge that covers capital and operational costs of facilities that collect water north of and within the Delta, as well as the Project's share of costs of the California Aqueduct, and San Luis Reservoir. Contractors also pay a transportation charge that covers the capital and operational costs of facilities that pump and convey water from the delta to the contractors. The capital costs are amortized over varying time periods, with the requirement that the Project's initial facilities be recovered by the end of 2035.

The average cost of delivering State Water Project water ranges between $250 per acre-foot in the San Joaquin Valley, to $600 per acre-foot in Southern California and as high as $1,440 per acre-foot on the Central Coast. However, costs per acre-foot vary significantly from year-to-year depending on whether hydrologic conditions are wet or dry.

The long-term average costs of State Water Project water are competitive when compared to alternatives such as stormwater conservation programs ($600 to $5,000 per acre-foot, with a median of $2,100) and water conservation efforts such as turf (lawn) removal rebate programs ($420 to $1,500 per acre-foot, with a median of $1,100). Other common water conservation programs such as replacing toilets and clothes washers with high efficiency models, installing weather-based controllers and rotating nozzles for irrigation, and rain barrels can have lower costs comparable to State Water Project water deliveries, however these programs are not scalable and could not replace a significant volume of Project water deliveries.

State Water Project water has a notably lower cost than water recycling programs, which can exceed $2,200 per acre-foot, and seawater desalination facilities, which can cost upwards of $2,800 per acre-foot.[7] In addition to cost considerations, permitting and building desalination facilities in Southern California have proven to be challenging. Currently, desalination accounts for less than one percent of Southern California's water supply. Additionally, alternatives like recycling, stormwater management, and conservation programs are often limited in scale, often producing less than 10,000 acre-feet of water per year.

[6] See Section V.
[7] See Section VI.

California's largest desalination plant, located in Carlsbad, has an annual capacity of 56,000 acre-feet. To replace the volume of water currently provided by the State Water Project to Southern California, twenty-five additional desalination plants of the same size as the Carlsbad facility would need to be permitted and constructed. This highlights the significant challenges in ensuring water supply reliability and underscores the crucial role the State Water Project will continue to play in California's future water security.

I. Introduction

Despite the key role the State Water Project plays in California's water supply, there is a lack of recent publications that review the available data on the scope of the economy it serves. This report addresses this gap by summarizing publicly available data on State Water Project water distribution, the scale of the urban and agricultural economies it supports, the extent to which underrepresented populations are served, and the costs associated with developing alternative water supplies. The primary objective of this report is to inform policymakers about the State Water Project's operations and the economy that is served by the State Water Project.

The report is not a comprehensive valuation of the benefits of the State Water Project and does not attempt to document the benefits or costs of the State Water Project's non-water supply related impacts and amenities such as power generation, flood control, or any recreational and environmental values. These other benefits are significant, but beyond the scope of this report.

This report relies on publicly available data from multiple sources. One extensively used source is the Department of Water Resources' Bulletin 132; this publication aggregates data on various aspects of the State Water Project, including water supply planning, construction, finance, management, and operations.[8] Also extensively relied on is Department of Water Resources' Water Balance Dataset, a program that calculates applied, net, and depletion water balances for California.[9] Additional economic and demographic data were sourced from various public outlets such as the California Employment Development Department, the US Census Bureau, and the Bureau of Economic Analysis.[10] Agricultural production figures were taken from annual crop reports produced by county agricultural commissioners.[11] Data on the classification of disadvantaged communities were sourced either from Department of Water Resources data or from the

[8] "Bulletin 132 Management of the California State Water Project," California Department of Water Resources.
Hereinafter referred to as "Bulletin 132."
[9] Water Plan Water Balance Data," California Natural Resources Agency.
Hereinafter referred to as "Water Balance Data."
Water balance data available annually from 2002 to 2019, except 2017. Department of Water Resources did not produce water balance estimates in 2017.
[10] "Employment by Industry Data," Employment Development Department.
"Population and Housing Unit Estimates," U.S. Census Bureau.
"Gross Domestic Product," Bureau of Economic Analysis.
[11] "California Agricultural Production Statistics," California Department of Food and Agriculture.

Office of Environmental Health Hazard Assessment's (OEHHA) CalEnviroScreen tool.[12] Other studies, described in further detail in Section VI, were consulted to assess the costs of alternative water supplies in Southern California.

The Department of Water Resources was created in 1956 with a mandate to create a comprehensive statewide water management system. During this period, the State Water Project was conceived to complement the existing federal Central Valley Project (CVP), which was primarily focused on agriculture in the Central Valley. The State Water Project addresses the geographical mismatch between the supply of water, which is concentrated in the snowpacks of Northern California, and the demand for water, which is concentrated in the cities and urban regions in Central and Southern California. In 1960, voters approved the California Water Resources Development Bond Act, which authorized the financing for the State Water Project's construction and ongoing management. One of the project's primary objectives is to provide a reliable water supply to urban and agricultural customers.

The core of the State Water Project's infrastructure includes thirty dams forming storage reservoirs, 705 miles of aqueducts, and thirty pumping and generating plants. Water is initially collected in Northern California's Feather River Basin. From there, water travels through the Feather and Sacramento rivers into the San Francisco Bay Delta. The San Francisco Bay Delta plays a pivotal role in this conveyance system, serving as a natural hub where water from the north meets the aqueducts leading to the south. At the Clifton Court Forebay water is lifted into the California Aqueduct, a 444-mile-long channel that conveys water to the south end of the San Joaquin Valley. Water is then pumped over the Tehachapi Mountains at the Edmonston Pumping Plant and into Southern California. Here the aqueduct splits into east and west branches, with terminal reservoirs that serve various parts of Southern California. Additional branch aqueducts serve specific communities in the North Bay and South Bay regions of the San Francisco Bay Area and on the Central Coast.

Oroville and the San Luis Reservoir, located near Los Banos, are key storage facilities that enhance the State Water Project's ability to provide reliable water supply. Lake Oroville has a capacity of 3.5 million acre-feet, while the San Luis Reservoir, a joint federal-state facility shared with the Central Valley Project, holds about two million acre-feet, of which the SWP's share is slightly over one million acre-feet.

In the face of climate change, California is expected to experience heightened water supply challenges. With rising temperatures and unpredictable weather patterns, managing the already complex water system will become increasingly demanding. Specifically, the impacts of climate change are anticipated to pose new challenges for the San Francisco Bay Delta, a crucial nexus in California's water supply chain.

[12] "DAC Mapping Tool," Department of Water Resources.
"Cal EnviroScreen 4.0," California Office of Environmental Health Hazard Assessment.

To adapt to these changes, the Department of Water Resources is currently pursuing the proposed Delta Conveyance Project and collaborating with agencies on other water storage projects, among other management plans and future projects. These plans are one part of the state's strategy to manage future water supply reliability.

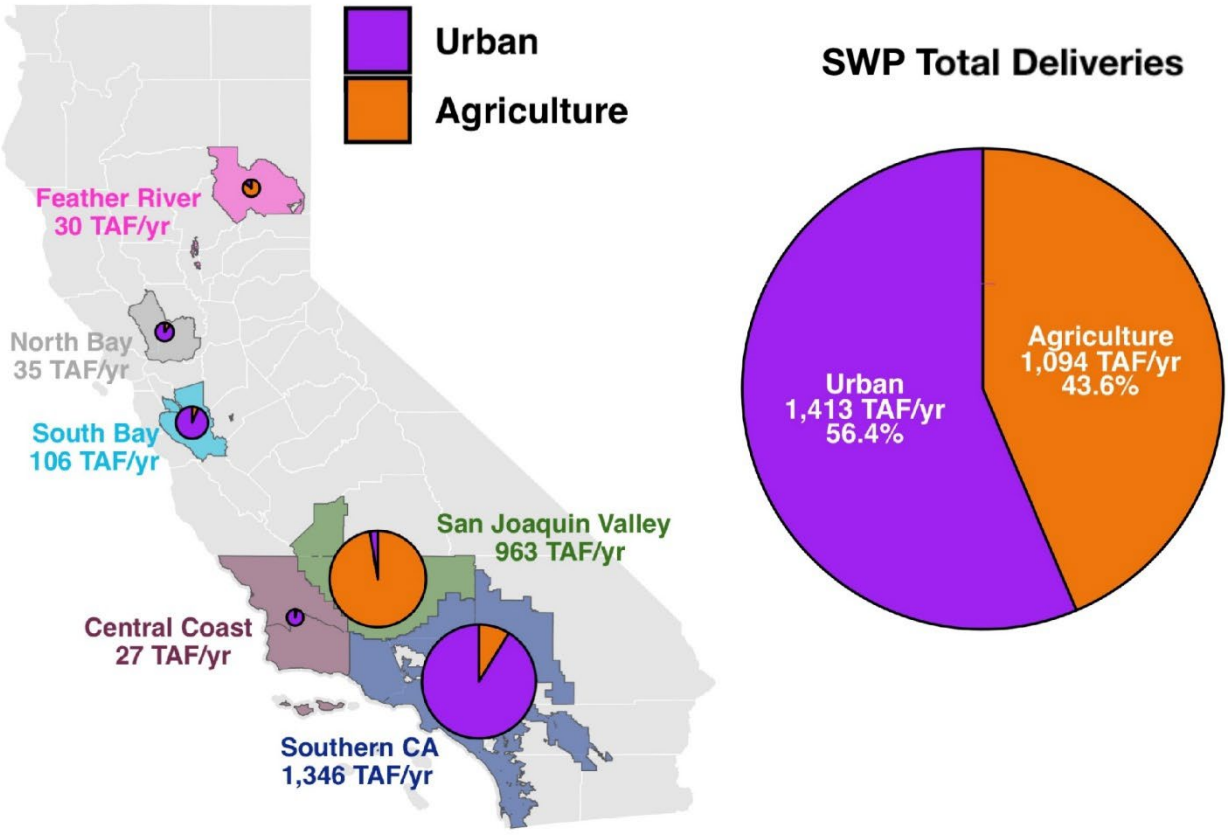
II. Water Use in the State Water Project Service Area

Figure 1 shows the six regions served by the State Water Project and how deliveries are used within the State Water Project service area. The text next to each region shows the average State Water Project deliveries over 18 years. The pie charts in Figure 1 illustrate the annual average breakdown of water use for each region and for the State Water Project service area as a whole. These figures are based on the Department of Water Resources' Water Balance Data. This dataset is based on simplified water budgets that compute applied, net, and depletion water balances for a water year, based on analyses of developed and dedicated water supplies, water uses by sector, water reuses, operational characteristics for an area, and inflows and outflows. These estimates are based on data from 2002 to 2019.[13]

On average, the State Water Project delivers over 2.5 million acre-feet of water annually. Around 1.4 million acre-feet of water, or 56.4% of total State Water Project deliveries, supply urban areas, including residential, commercial, and industrial customers and other urban water uses such as parks, landscaping, and urban fire suppression. Deliveries to the agricultural sector constitute around 1.1 million acre-feet per year, or around 43.6% of total State Water Project deliveries.

[13] Note that these estimates exclude data from 2017. DWR did not produce data for this year.

Figure 1: Water Use in the State Water Project Service Area



Sources: Department of Water Resources, "Water Plan Balance Data."
Note: Units in thousands of acre-feet per year. Water use averaged over 2002-2019 (excluding 2017, for which data was not available).

Southern California receives about 1.35 million acre-feet of State Water Project water per year on average, or around 54% of all water deliveries. Around 90% of all State Water Project water use in Southern California is in the urban sector.[14] Within Southern California, the Metropolitan Water District of Southern California (MWD) is the single largest user of State Water Project water. Currently about 24% of total water needs come from State Water Project deliveries, according to MWD's Integrated Resource Plan.[15] The MWD serves a large area that includes parts of six counties: Los Angeles, Orange, San Diego, Riverside, San Bernardino, and Ventura. The district provides water to twenty-six member agencies, which in turn supply water to a total of approximately nineteen million people.

[14] Department of Water Resources, "Water Balance Data."
[15] "The Integrated Water Resource Plan," The Metropolitan Water District of Southern California.

The State Water Project delivers on average 963 thousand acre-feet per year to the San Joaquin Valley, around 90% of which is delivered to Kern County. Unlike Southern California, State Water Project water is primarily used for agricultural purposes in the San Joaquin Valley.

The South Bay counties of Santa Clara and Alameda receive around 106 thousand acre-feet of State Water Project water per year. Water in the South Bay is predominantly used in the urban sector. The North Bay aqueduct delivers on average thirty-five thousand acre-feet per year, primarily to urban customers in Napa and Solano Counties in the North Bay. The Central Coast aqueduct supplies on average twenty-seven thousand acre-feet per year of water to San Luis Obispo and Santa Barbara counties, again mostly to the urban sector. Finally, in the Feather River Basin, thirty-six thousand acre-feet per year of water is used for both agriculture and urban sectors.

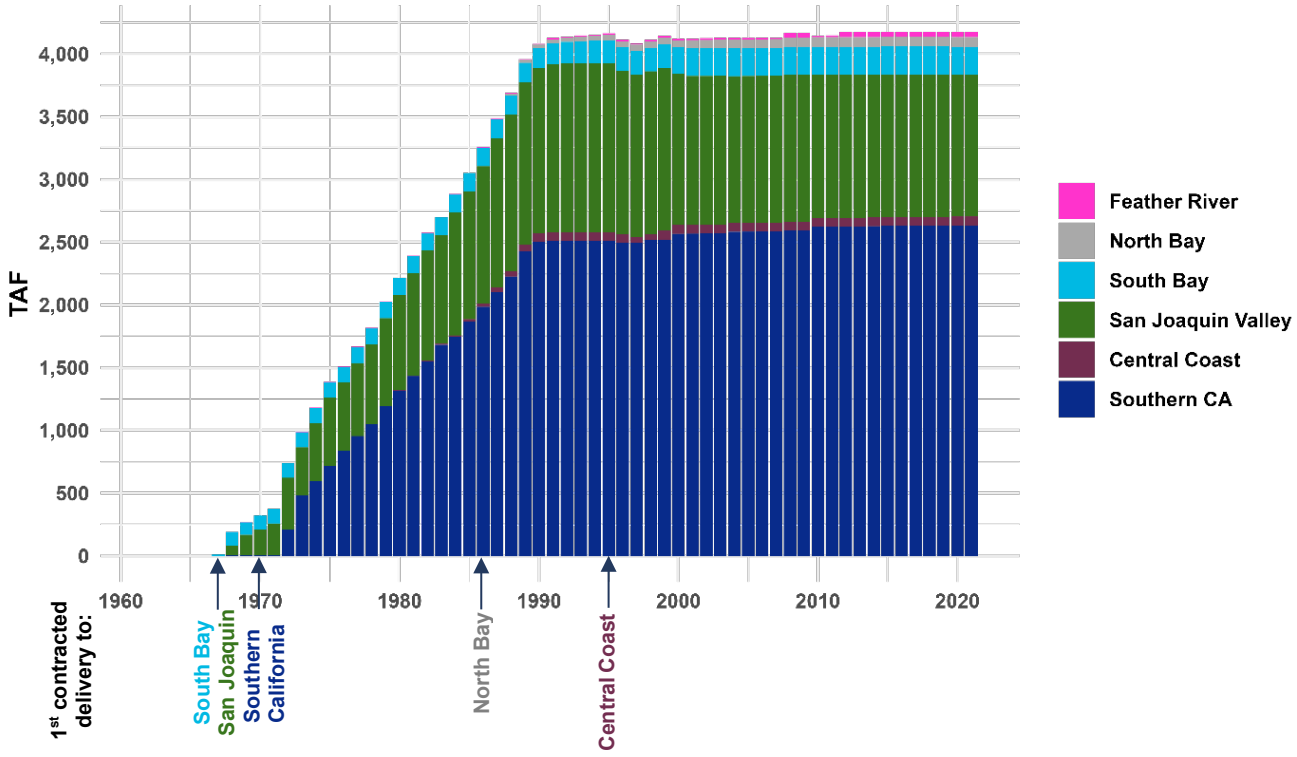
State Water Project deliveries are allocated among contractors in three ways: Table A deliveries, carryover storage, and Article 21 deliveries. Table A water serves as the cornerstone of the State Water Project's allocations, providing long-term stability for both urban and agricultural customers through providing contractors with a share of the available water each year. Carryover storage offers contractors the flexibility to store Table A allocations for future use, as part of a risk mitigation policy to protect against future dry periods. Article 21 water is available occasionally, providing short-term opportunities to access additional supplies when conditions permit.

Figure 2 shows the history of maximum contractual Table A allocations by service area. Currently, almost 4.2 million acre-feet of water is contracted as Table A. Southern California accounts for 63% of the contracted maximum Table A volume, with Metropolitan Water District alone contracting 45%. Contractors in the San Joaquin Valley hold 27% of the maximum Table A volume. Contractors in the South Bay hold 5% of total allocations, whilst contractors in the Feather River Basin, North Bay, and Central Coast each hold 1 to 2%.

Figure 2 shows how the volumes of water contracted under Table A increased over time as new project facilities came online. The first contracted deliveries of project water to the South Bay and San Joaquin Valley began in 1968.[16] In 1971, the Edmonston Pumping Plant began operating, delivering the first water to Southern California. In 1987, the North Bay Aqueduct was completed, allowing the State Water Project to deliver the first contracted water to the North Bay.[17] The first deliveries to the Central Coast began in 1996, with the Central Coast Aqueduct completed and dedicated shortly after in 1997. The East Branch Extension (EBX) of the State Water Project, completed in two phases between 2003 and 2017, supplies project water to eastern San Bernardino County in Southern California[18].

[16] Between 1962-1968, the State Water Project supplied non-project water to contractors in the South Bay, as shown in Figure 3.
[17] Between 1968-1987, the State Water Project supplied non-project water to contractors in Napa Valley through an interim facility.
[18] "Projects and Facilities," San Gorgonio Pass Water Agency.

Figure 2: History of State Water Project Maximum Contractual Table A Allocations by Service Area (1962-2021)

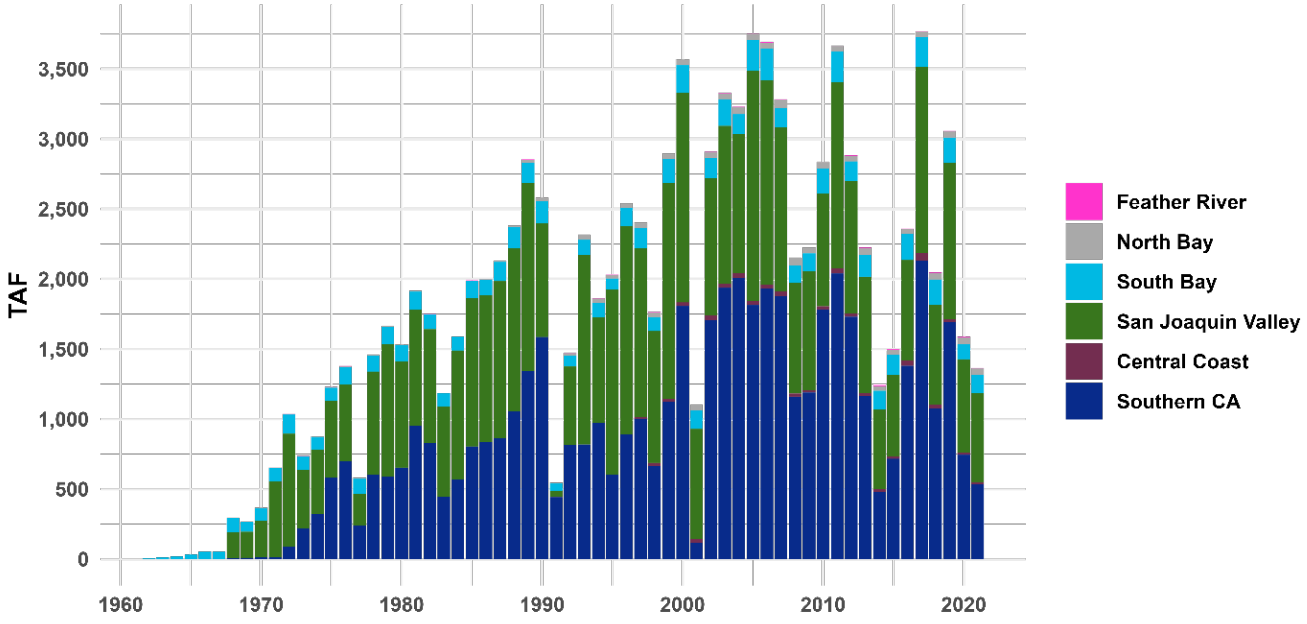


Source: California Department of Water Resources, "Bulletin 132-22, Table B-4."

Table A allocations provide the basis for extended planning, however actual deliveries vary considerably based on year-to-year water availability and operational considerations. Figure 3 shows the full history of actual deliveries to each region in the State Water Project service area. These data include both Table A allocations, as well as carryover water and Article 21 water. Over the past 20 years, State Water Project contractors have received on average 63% of their Table A allocation.[19] Figure 3 highlights the variable nature of water supply; California's climate is characterized by patterns of alternating dry and wet periods, often resulting in challenges for water resource management.

[19] California Department of Water Resources, "Bulletin 132-22, Appendix Tables B-4 and B-5B."

Figure 3: History of State Water Project Deliveries by Service Area (1962-2021)



Source: California Department of Water Resources, "Bulletin 132-22, Table B-5B."

III. The Urban Economy of the State Water Project

The State Water Project contractors supply water to urban customers in all six State Water Project service regions. These regions are home to over two-thirds of California's population, including six of the state's ten largest cities.[20] Urban water customers include residential, commercial, and industrial customers, as well as municipal uses of water such as public parks. A reliable water supply is essential for these customers; it plays a critical role in public health and sanitation, attracting and retaining the residential and business customers that drive economic growth, and contributing to the overall quality of life.

Within this service area, the State Water Project provides 20% of all water for urban consumption, making it a critical part of the area's water supply portfolio. Table 1 below presents summary statistics describing the size of the economy in each of the six service regions. In total, the State Water Project service area contains twenty-seven million residents and serves an area with a GDP of about $2.3 trillion and a median household income of $85,460. This median income is about 23% higher than the average for the United States.[21] The

[20] The six cities supplied by the State Water Project are Los Angeles, San Diego, San Jose, Long Beach, Bakersfield, and Anaheim. Of the remaining four largest cities, three are supplied by other large water conveyance projects: San Francisco is supplied by San Francisco Public Utility Commission's Hetch Hetchy Aqueduct, Fresno by the Central Valley Project's Friant Division, and Oakland by East Bay Municipal Utility District's Mokelumne Aqueduct. Sacramento draws water directly from the Sacramento River.

21 Based on a 2021 American Community Survey estimate of national median household income of $69,717 in 2021 dollars. Gloria Guzman, "Household Income 2021, American Community Survey Briefs," US Census Bureau, October 2022.

State Water Project service area also contains 800,000 businesses that employ more than seven million workers.[22] These urban customers include many underrepresented communities who depend on the State Water Project for a low-cost and reliable water supply. The economic and demographic characteristics of these communities are further discussed in Section V.

Customers in Southern California account for the majority of State Water Project deliveries to urban customers, on average around 1.4 million acre-feet of water per year, or 86% of all urban State Water Project deliveries. Southern California also relies the most heavily on State Water Project water for its urban water supply, with State Water Project deliveries accounting for 28% of its total urban water consumption. Other major sources of urban water supply in Southern California include the Los Angeles Aqueduct, the Colorado Aqueduct, and local surface and groundwater supplies. In terms of salinity, the quality of State Water Project deliveries is significantly better than Colorado Aqueduct deliveries or local groundwater supplies, which in some cases must be treated or blended before use.[23] The State Water Project's Southern California service area has a population of over 22.1 million with a GDP of $1.6 trillion. The Southern California service area includes over 600,000 businesses employing over seven million individuals. The assessed value of property in the State Water Project Service Area is estimated to exceed $3.3 trillion.

The second largest recipient of State Water Project urban water is the South Bay region, including Santa Clara and parts of Alameda County, which receives 7% of total State Water Project urban water deliveries. The State Water Project accounts for 15% of all urban water use in the South Bay. The region's other major water sources include local surface- and groundwater supplies, the Central Valley Project, and the Hetch Hetchy aqueduct. The South Bay service area has a population of over 2.6 million. This region is home to the Silicon Valley tech industry and has a median household income over 50% higher than the State average.

In addition to the urban economies in Southern California and the South Bay, the State Water Project also delivered over eighty-six thousand acre-feet per year to urban customers in the other State Water Project service areas: the Feather River, North Bay, San Joaquin Valley, and Central Coast. These areas have a combined population of over 2.6 million and a combined GDP of over $160 billion.

[22] Note that these estimates include all individuals in the State Water Project service area, not only those who receive residential water from the State Water Project.

[23] The high salinity and contamination in groundwater supplies and Colorado Aqueduct deliveries in Southern California causes hundreds of millions of dollars' worth of damages each year, a disadvantage that is not shared by State Water Project Deliveries. See the results of the Bureau of Reclamation's Salinity Economic Impact Model.

Table 1: Urban Water Use in the State Water Project Service Area

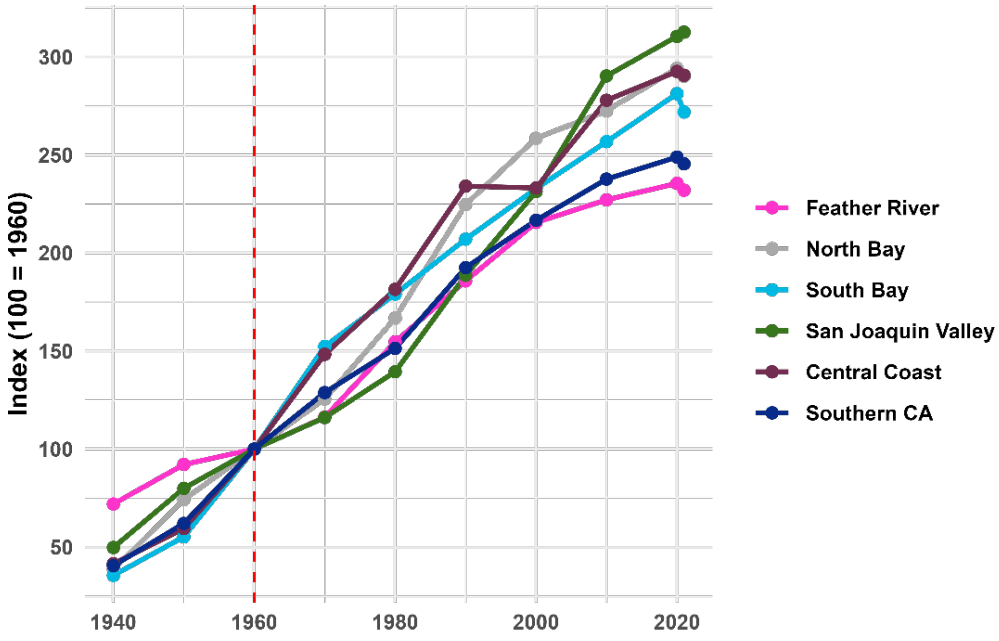
SWP Water Region	SWP Deliveries (TAF / yr)	SWP Deliveries as % of Total Urban Water Supply	Population in SWP Service Area	Median HH Income ($ 2021)	GDP Total ($ Bns 2021)	No. Businesses in SWP Service Area	Employment in SWP Service Area	Assessed Property Value in SWP Service Area ($ Bns 2021)
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Feather River	3.7	3%	318,208	$63,450	$3.4	8,110	18,751	$30.7
North Bay	31.4	7%	584,557	$90,862	$46.3	41,406	192,858	$93.4
South Bay	99.1	15%	2,555,414	$132,548	$460.8	90,219	975,767	$602.7
San Joaquin Valley	24.7	2%	1,043,142	$59,686	$59.5	66,071	259,060	$104.9
Central Coast	26.3	19%	656,421	$84,717	$52.1	20,846	212,092	$84.6
Southern CA	1,222.8	28%	22,051,662	$81,419	$1,630.1	596,652	7,078,430	$3,345.5
Total	**1,408.1**	**20%**	**27,209,404**	**$85,460**	**$2,252.2**	**823,304**	**8,736,958**	**$4,261.7**

Sources and Notes:
[2], [3]: California Department of Water Resources, "Water Balance Data." Annual averages based on data from 2002 to 2019 (missing 2017). Calculated from DAU level data aggregated to the service areas of State Water Project contractors.
[4]: "Bulletin 132-19 Table 1-6 Estimated Population, California Department of Water Resources.
[5]: "2021 American Community Survey 5-year Estimates, Census Tract-level median household income data." US Census Bureau.
Weighted average calculated across census tracts by population and State Water Project service area coverage.
[6]: "Regional GDP data (2021)," Bureau of Economic Analysis.
County-level GDP data aggregated to State Water Project service regions based on State Water Project contractor service area coverage.
[7]: "County Business Pattern," US Census Bureau.
County-level data on business establishment aggregated based on State Water Project contractor service area coverage.
[8]: "2021 American Community Survey 5-year Estimates," US Census Bureau.
Census Tract-level data on total employment data aggregated based on the population within the service areas of State Water Project contractors.
[9]: Bulletin 132-19, Table 1-6 Assessed Valuation, measured in 2021 dollars.

Figure 4 shows the changes in population in each State Water Project service region since 1940, while Figure 5 shows changes in median real household income since 1960. Data for both figures were sourced from the Decennial Census and the American Community Survey. Both population and median household income have grown in all regions over time. Since 1960, the population more than doubled in Southern California, nearly tripled in the Central Coast, South Bay, and North Bay, and more than tripled in the San Joaquin Valley. Household income increased by 25% in rural Feather River and San Joaquin Valley regions. The North Bay

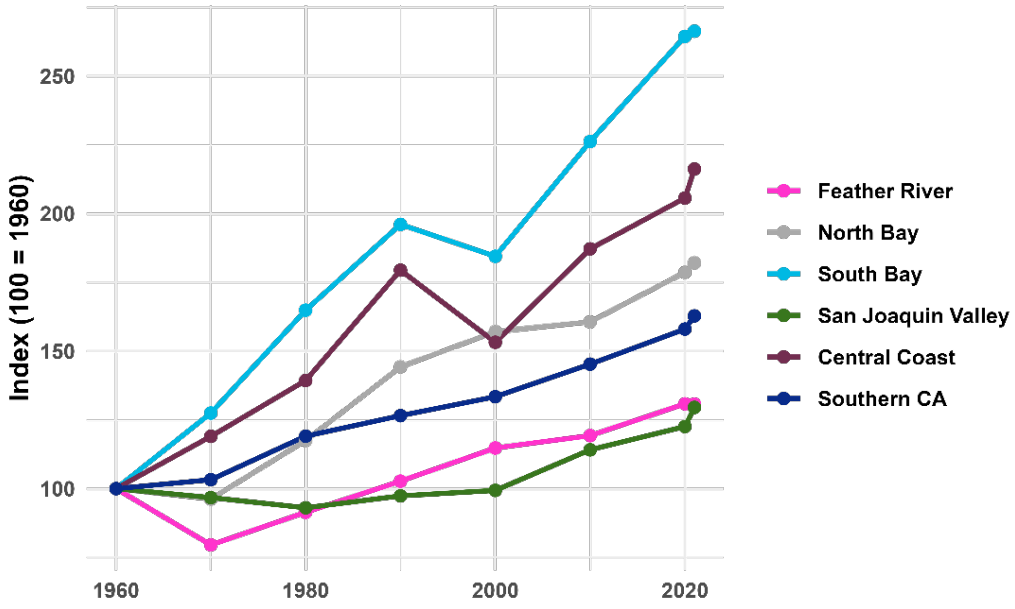
and Southern California regions saw increases exceeding 50% and the Central Coast more than doubled its household income. The South Bay saw the largest growth in median household income at over 150%.

Figure 4: Population Growth in the State Water Project Service Area (1940 – 2021)



Sources: Decennial Census (1940 to 2020), US Census Bureau; American Community Survey (2021), US Census Bureau.
Notes: 1960 Population = 100. County-level population data aggregated to State Water Project service regions.

Figure 5: Median Household Income Growth in the State Water Project Service Area (1960 – 2021)



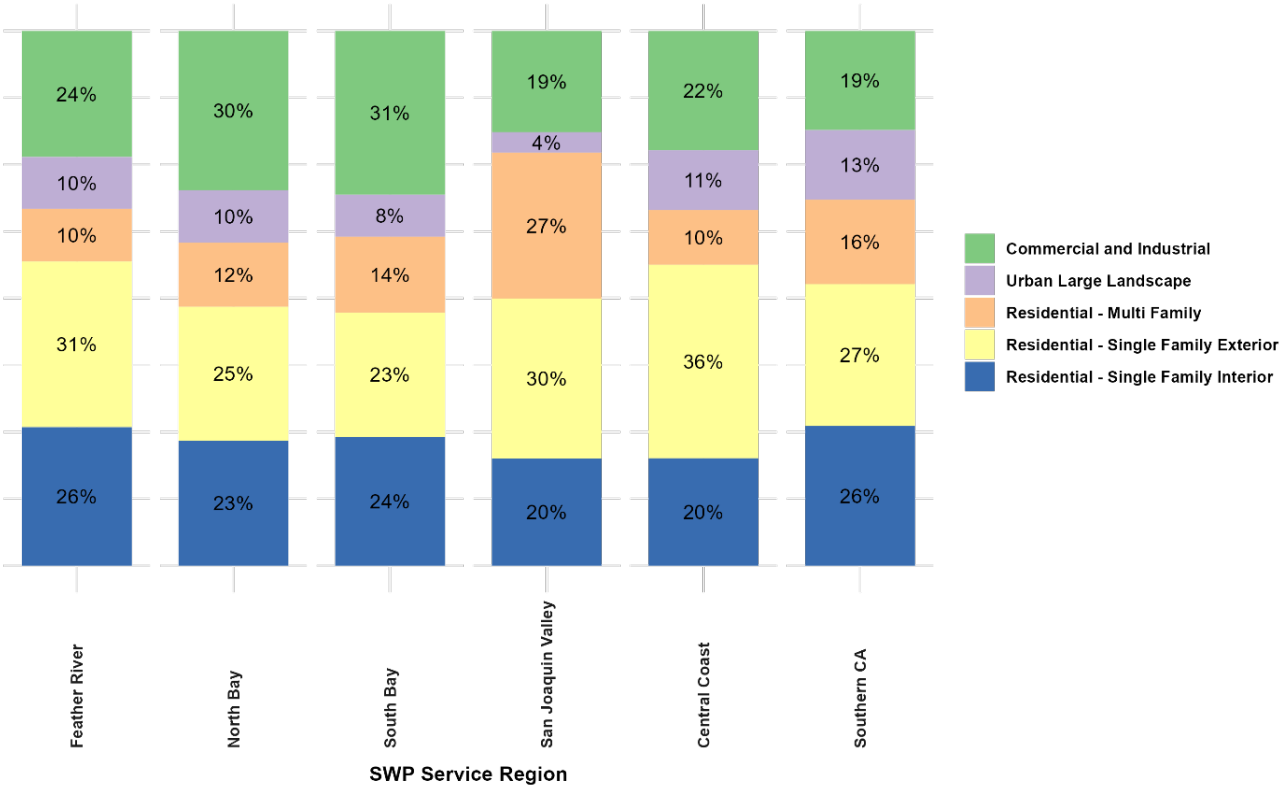
Sources: Decennial Census (1960 to 2020), US Census Bureau; American Community Survey (2021), US Census Bureau.
Notes: 1960 Median Household Income = 100. County level median household income data weighted and aggregated by population served by State Water Project.

Figure 6 shows the percentage breakdown by sector of urban water use within each service area. These sectors include commercial and industrial, urban large landscapes (e.g., parks, golf courses and urban green spaces), multi-family domestic water use, single family exterior (e.g., gardens and yards), and single-family interior.

Most of Southern California's urban water use is in the residential sector, accounting for 69% of the 4.2 million acre-feet used per year. Within the residential sector, 77% of water is consumed by single family units, with a similar split across interior domestic water consumptions and exterior landscape use. Multi-family water consumption only accounts for less than a quarter of all residential water use. Southern California uses the lowest percentage of water in commercial and industrial sectors, but the highest percentage of water in managing large urban landscapes.

Across all service areas, the single-family exterior water use remains the highest at 1.77 million acre-feet per year, 27% of the total urban water consumption. The second highest water use is in the single-family interior sector at 1.6 million acre-feet per year, 25% of the total urban water consumption. Overall, single-family water consumption accounts for more than half of all urban water use across all service areas. Commercial and industrial water use comes third at 1.35 million acre-feet per year, 20% of the total urban water consumption.

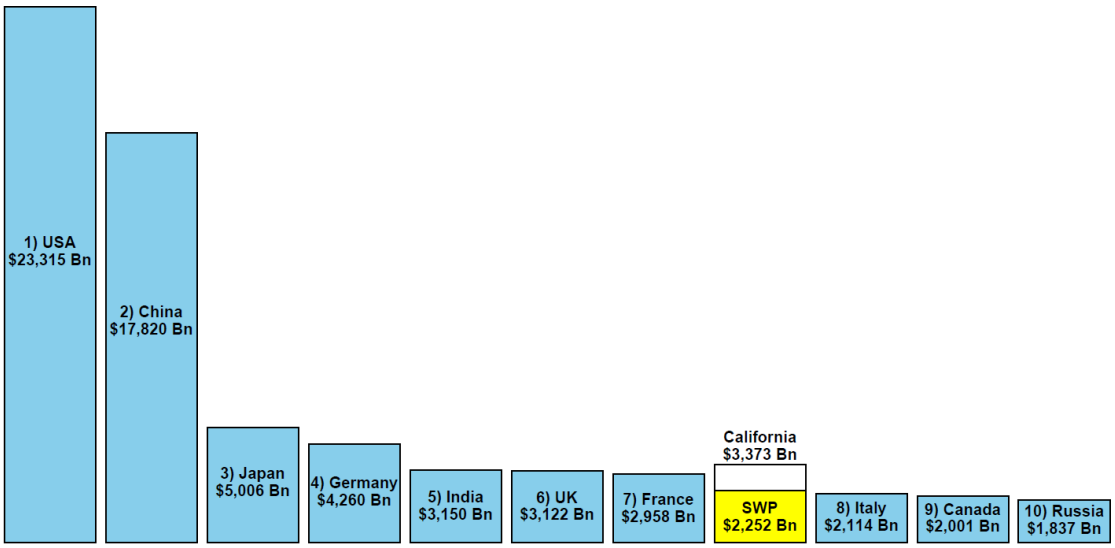
Figure 6: Breakdown of Urban Water Use by Sector



Source: Department of Water Resources, "Water Balance Data."
Note: Water use averaged over 2002 to 2019, except 2017 where data is unavailable.

Figure 7 compares the economy served by the State Water Project with the major world economies, as measured by their GDPs. The State Water Project serves a region equivalent to almost 10% of U.S. GDP and two-thirds of California's GDP, at $2.2 trillion. The State Water Project service area's economy is between the size of those of France and Italy, the 7th and 8th largest economies in the world.

Figure 7: If the State Water Project Service Area Were a Country, it Would Be the World's 8th Largest Economy



Source: "GDPRanking," The World Bank Group.
Notes: GDP measured in billions of 2021 United States Dollars. GDP of economy served by State Water Project calculated by aggregating GDP of counties served by State Water Project, weighted by the proportion of population served by State Water Project.

Table 2 compares the State Water Project with other major domestic water conveyance projects in the USA, as well as the economies they serve. The State Water Project is the largest domestic water transfer infrastructure in the country, in considering distance of water transferred, size of economy served, population served, and size of associated water infrastructures. Although the Central Valley Project and the All-American Canal both convey larger volumes of water than the State Water Project, these projects primarily supply the agricultural sector, and thus support a much smaller economy.

Other projects serve areas that overlap with the State Water Project. The Colorado River Aqueduct, which diverts water from the Colorado River to Coastal Southern California, delivers 1.2 million acre-feet annually to Los Angeles, San Bernadino, Orange, and San Diego Counties. The Los Angeles Aqueducts, serving the City of Los Angeles, transfers around 425 thousand acre-feet of water per year from the Owens River to San Fernando and Los Angeles. The Central Valley Project serves the San Joaquin Valley.

Table 2: Comparison of the State Water Project to Other Water Conveyance Projects in the USA

	Project Name	Economy Served (Billions of 2021 US$)	Water Source(s)	Destination(s)	Purposes of Water Transfer	First Operations	Total Water Transfer Distance (Miles)	Total Water Transfer Volume (TAF/Year)
[1]	California State Water Project	$2,252	Lake Oroville	Southern California, SF Bay Area, San Joaquin Valley	Domestic Supply; Irrigation	1962	701	2,700
[2]	Colorado River Aqueduct	$1,501	Colorado River	Southern California	Domestic Supply	1939	242	1,216
[3]	New York City Water Supply System	$1,068	Catskill / Delaware Watersheds	New York City	Domestic Supply	1842 (Expanded in 1890, 1916, and 1953)	251	2,240
[4]	Los Angeles Aqueducts	$836	Owens River	Los Angeles	Domestic Supply	1913 (Second Aqueduct 1970)	370	425
[5]	Central Valley Project	$663	Trinity, San Joaquin, Sacramento River Basins	San Joaquin Valley and SF Bay Area	Domestic Supply; Irrigation	1933	373	7,003
[6]	Central Arizona Project	$366	Colorado River	Central and Southern Arizona	Domestic Supply; Irrigation	1992	336	1,500
[7]	All-American Canal	$10	Colorado River	Imperial Valley	Domestic Supply; Irrigation	1942	81	18,934

Notes: Estimates of the size of the economy served by each project are calculated based on the service area of each project using BEA county-level GDP data. All other information was referenced from the sources below.

Sources: Shumilova, Oleksandra, et al., "Global Water Transfer Megaprojects: A Potential Solution for the Water-Food-Energy Nexus?," *Frontiers in Environmental Science*, Vol. 6 (2018), https://doi.org/10.3389/fenvs.2018.00150; "Regional GDP data (2021),"Bureau of Economic Analysis; Rennenkampf, Lenore, "National Register of Historic Places nomination, Old Croton Aqueduct," *U.S. National Archives*; "A History of the NYC Water Supply System," Duke Geological Laboratory; "Out of the Archives: 75 Years of Delaware System Water," NYC Water.

Table 3 below compares the State Water Project with other major domestic water conveyance projects in the world. Many countries have adopted similar large-scale water transfer projects to mediate the imbalance of water distributions.[24] Like the State Water Project, most of these projects serve multiple purposes, including energy generation, agricultural, residential, and commercial water supply. Of all the projects, the State Water Project serves the second largest economy, and is among the top three projects in terms of distance water is conveyed. The largest projects in this table from China, Israel and Mexico are briefly described below:

China operates the highest volume and longest water conveyance system in the world.[25] China's water shortage problem is prominently a water distribution problem, exacerbated by a large population. To address these issues, the South-to-North Water Diversion Project was approved, and construction commenced in the

[24] Rodell, M. et al, "Emerging trends in global freshwater availability," *Nature* 557, doi: 10.1038/s41586-018-0123-1.
[25] "South-to-North Water Diversion Project," Water Technology.

early 2000s.[26] The eastern route serves three provinces, benefiting more than 83 million residents with an annual delivery of more than 7 million acre-feet of water.[27] The central route delivers nearly 12 million acre-feet of water to Beijing, Tianjin, Hebei, and Henan. The current two operating routes now transfer almost 20 million acre-feet of water over 1,600 miles, supporting a residential, industrial, and agricultural economy of nearly five trillion dollars, and a population of over one billion. Upon completion, all three routes are estimated to deliver a total of 35 million acre-feet.

Israel's National Water Carrier transports desalinated sea water from the north, which makes up about half of the country's freshwater supply, to replenish Lake Kinneret and service domestic water supply across the country.[28] Managed by the state-owned national water company Mekorot, the project delivers more than 500 thousand acre-feet of residential, commercial, and agricultural water across the country, as well as Jordan, the Palestinian Authority and Gaza Strip.[29] Israel now has a 20% water surplus, and exports some excess water to neighbors like Jordan, even during the drought years.

The Cutzamala System in Mexico was constructed to divert water from the Cutzamala and Lerma-Balsas River systems to the north of Mexico City and the State of Mexico. The water traverses nearly 150 miles and is pumped to a height of more than 1,300 meters using 102 pumping stations.[30] Despite the high energy cost of operation, the system delivers 388 thousand acre-feet of water for urban, industrial, and agricultural uses that support an economy of $338 billion. Despite this conveyance system, Mexico City still struggles with water supply reliability; many neighborhoods receive have intermitted water supplies.

[26] "South-to-North Water Diversion Project, China," University of Chicago.
[27] "南水北调东线工程通水十年：直接受益人口超 8300 万 综合成效显著," Tibet.cn.
[28] "Reverse water carrier launched to refill Kinneret," Globes.
[29] "Israel Has Become a Water Powerhouse," The Jerusalem Post.
[30] "Summary: Cutzamala System," Auburn Sciences and Mathematics.
"The Cutzamala System," Water for Urban Areas, Foods and Nutrition Library.

Table 3: Comparison of State Water Project to Other International Water Conveyance Projects

	Project Name	Country	Economy Served (Billions of 2021 US$)	Water Source(s)	Destination(s)	Purposes of Water Transfer	First Operations	Total Water Transfer Distance (Miles)	Total Water Transfer Volume (TAF/Year)
[1]	California State Water Project	USA	$2,252	Lake Oroville	Southern California, SF Bay Area, San Joaquin Valley	Domestic Supply; Irrigation	1962	701	2,700
[2]	South-to-North Water Diversion Project (Eastern)	China	$3,953	Yangtze River	Shandong, Anhui, Jiangsu Province	Domestic Supply; Irrigation	2013	718	11,999
[3]	South-to-North Water Diversion Project (Central)	China	$1,063	Yangtze River	Henan, Hebei, Beijing Province	Domestic Supply; Irrigation	2014	890	7,296
[4]	Jiang Shui Bei Diao Project	China	$440	Yangtze River	Northern Jiangsu Province	Domestic Supply	1980	249	2,675
[5]	National Water Carrier of Israel	Israel	$391	Galilee Sea	Most of Israel	Domestic Supply; Irrigation	1964	81	503
[6]	Cutzamala System	Mexico	$338	Cutzamala River	Greater Mexico City	Domestic Supply	1993	138	388
[7]	Tagus-Segura Transfer	Spain	$59	Upper Tagus River	Murcia Region	Domestic Supply; Irrigation	1978	178	247
[8]	Indira Gandhi Canal	India	$48	Harike Wetland	Northwest Rajasthan	Domestic Supply; Irrigation	1983	244	8,600
[9]	Goldfields Water Supply Scheme	Australia	$5	Helena River	Coolgardie and Kalgoorlie	Domestic Supply; Irrigation; Mining	1903	329	26,632
[10]	Yin Da Ru Qin Project	China	$5	Datong River	Lanzhou New District	Domestic Supply	1995	549	3,591

Sources: Shumilova, Oleksandra, et al., "Global Water Transfer Megaprojects: A Potential Solution for the Water-Food-Energy Nexus?," *Frontiers in Environmental Science*, Vol. 6 (2018), https://doi.org/10.3389/fenvs.2018.00150;
[2]: Yang, Zitong, et al., "Benefit Evaluation of East Route Project of South to North Water Transfer Based on Trapezoid Cloud Model," *Agricultural Water Management*(2021).
[3]: 人民网, 央广网, 网易新闻, China Briefing.
[4]: Jiangsu Province Water Board, Frontiers in Environmental Science, Baijiahao.
[5]: The Jerusalem Post, The World Bank.
[6]: Frontiers in Environmental Science, Statista.
[7]: El Regadío, One World - Nations Online, City Population, Expansíon.
[8]: PRS Legislative Research.
[9]: Remplan, Water Technology.
[10]: 甘肃经济信息网, 搜狐新闻, 安徽农业科学.

IV. The Agricultural Economy of the State Water Project

The State Water Project water is used in the agricultural sector primarily in the southern San Joaquin Valley, but State Water Project water is also used in agriculture in most other regions supplied by the project. Kern, Kings, San Diego, and Ventura receive the vast majority of all agricultural State Water Project deliveries, at over 93%, based on Department of Water Resources Water Balance Data. Table 4 below

provides an overview of agricultural water use in the four top State Water Project delivery counties. Kern is by far the largest recipient of agricultural water deliveries, receiving 75% of all deliveries. These State Water Project agricultural deliveries are a component of all agricultural water use in these four counties, as they make up between 6 and 29% of total agricultural water use per county. State Water Project agricultural deliveries comprise nearly one quarter of all agricultural water used in Kern County.

In total, the State Water Project service area employs around 160,000 farm workers, according to 2021 data from the Employment Development Department (EDD) Current Employment Statistics (CES) dataset.[31] Farm employment in the top four counties totals over 113,000. Kern County alone makes up about 43% of total farm employment within the State Water Project Service Area.

The total value of agricultural production in regions served by the State Water Project exceeds $19 billion, with over $8 billion worth of production in Kern County alone. Table 4 below also lists the top value agricultural products in each of the four counties and for the entire State Water Project service area. The largest crops in Kern County include table grapes, oranges, tangerines/tangelos, pistachios, and almonds. In Kings County there is significant dairy and cattle production, and cotton is grown in the Tulare Lakebed. In coastal areas such as San Diego and Ventura Counties, nursery crops, raspberries and avocados predominate.

Table 4: Agricultural Water Use in the State Water Project Service Area

County	Average SWP Agricultural Deliveries (TAF / yr)	% of Total SWP Agricultural Deliveries	% of SWP Water Use in Agriculture	Farm Employment	Value of Agricultural Production ($ Bns 2021)	5 Highest Value Agricultural Products
[1]	[2]	[3]	[4]	[5]	[6]	[7]
Kern County, CA	803	74.9%	23.9%	69,000	$8.22	Grapes, Citrus, Pistachios, Almonds, Milk
Kings County, CA	99	9.2%	6.4%	8,095	$2.32	Milk, Pistachios, Almonds, Cotton, Cattle
San Diego County, CA	64	6.0%	29.2%	8,945	$1.67	Nursery, Flowers, Avocados, Vegetables, Citrus
Ventura County, CA	38	3.6%	11.6%	26,677	$2.04	Berries, Citrus, Nursery, Avocados, Vegetables
Other	68	6.3%	0.5%	47,261	$4.80	Grapes, Berries, Nursery, Milk, Lettuce
Full SWP Service Area	**1,072**	**100%**	**5.24%**	**159,978**	**$19.06**	**Grapes, Nursery, Berries, Milk, Almonds**

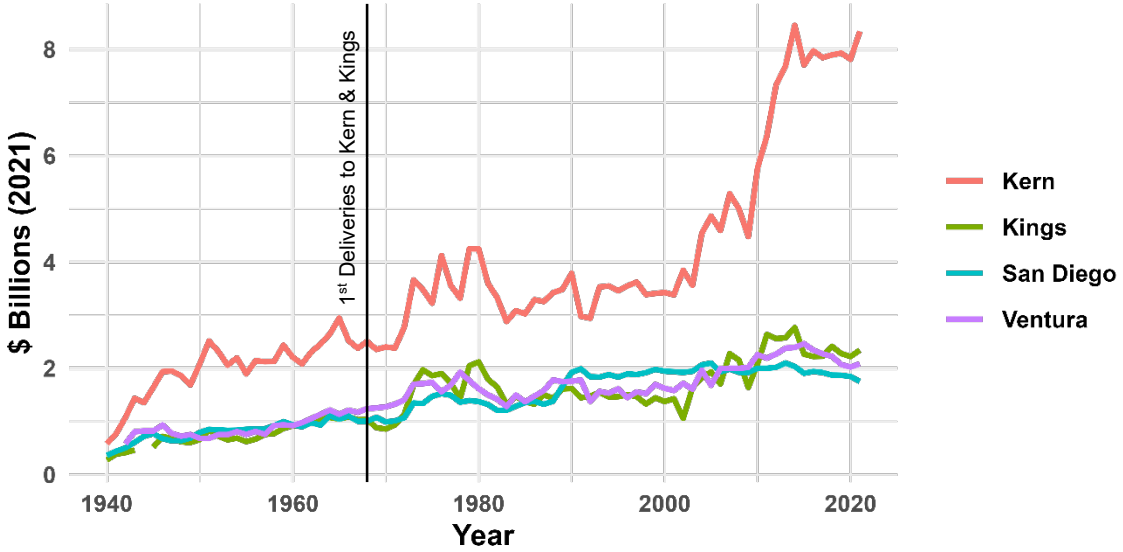
Notes:
[1]: 4 counties with largest average volume of agricultural water deliveries from the State Water Project.
[2]: Department of Water Resources, "Water Balance Data." Annual averages based on data from 2002 to 2019 (missing 2017). Calculated from DAU level data aggregated to the service areas of State Water Project contractors.
[3]: State Water Project agricultural water deliveries in county as a share of total State Water Project agricultural water deliveries. Calculated based on [2]
[4]: State Water Project agricultural deliveries in county calculated as a share of total agricultural water use in the county. Calculated based on Department of Water Resources Water Balance Data.
[5]: 2021 Employment Estimates by Sector, Employment Development Department, aggregated monthly data (maximum)

[31] Note the CES data may undercount farm labor because the data does not include the self-employed, unpaid family workers, and private household employees. The data may also undercount farm contract laborers.
"Current Employment Statistics (CES)," State of California Employment Development Department.

[6], [7]: 2021 County Agricultural Commissioners' Annual Crop Reports, measured in Billions of 2021 USD.

Figure 8 captures the growth in agricultural production value over time for Kern, Kings, San Diego, and Ventura counties. All four counties have steadily grown in agricultural value since the first State Water Project deliveries in 1968. The value of agricultural production has about doubled since then, in the case of Kings, San Diego, and Ventura counties, and has more than tripled in Kern County. Kern County experienced a significant uptick in production value over the past couple of decades, due in large part to almonds and pistachios.

Figure 8: Agricultural Production in Counties with Significant State Water Project Water Use in Agriculture



Source: County Agricultural Commissioners' Annual Crop Reports.
Notes: Top 4 Counties based on volumes of State Water Project Agricultural Delivery based on Department of Water Resources Water Balance Data. Total value of agricultural production measured in billions of 2021 USD. The first deliveries to Kern & Kings counties began in 1968. First deliveries to San Diego via Metropolitan Water District began in 1971. Some communities in Ventura began receiving State Water Project water from Metropolitan in 1971, however Ventura County itself did not become a State Water Project contractor until 1990.

In Kern and Kings counties in particular, agriculture plays a dominant role in the local economy and labor market. Farm employment makes up almost 20% of all employment in these counties, and many other jobs are in adjacent sectors supporting the agricultural economy.

V. Underrepresented Communities Served by the State Water Project

Low-income and environmentally impacted communities make up a sizable number of the residents in the State Water Project service area. California's Human Right to Water Law (Assembly Bill 685) requires that

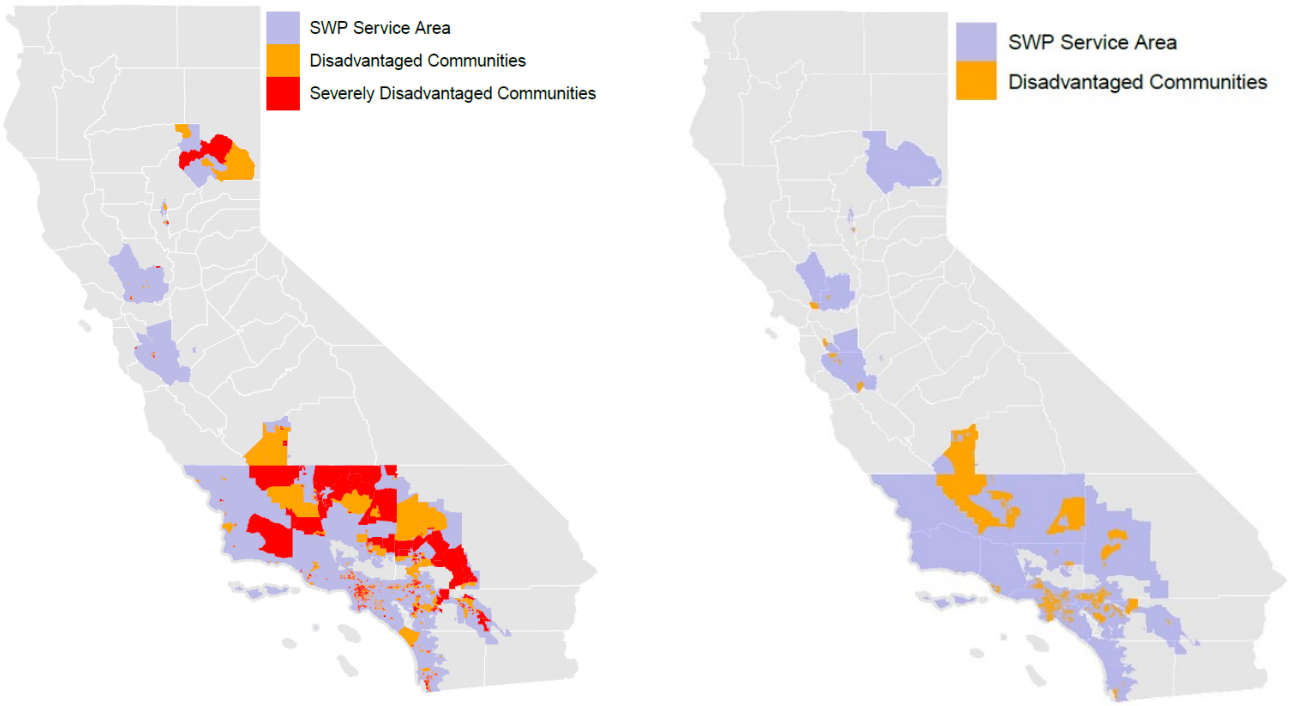
every resident have access to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. Furthermore, many state-run bonds and grants have requirements that target funds at projects that benefit communities that are identified as “disadvantaged.”

Defining "disadvantaged communities" (DACs) in state programs began in the early 2000s, when the term was used to allocate drinking water bonds to communities with a median household income (MHI) below 80% of the state average. However, DAC definitions that focus only on income are not able to capture other comprehensive social, environmental, and climate-related impacts that led to disparities in quality-of-life outcomes. Different state programs have adopted differing definitions of DAC over time to include some of these additional vulnerabilities. Most notably, the California Environmental Protection Agency (CalEPA) was assigned the responsibility of defining DACs for the purposes of grant programs they manage related to California’s cap and trade program, and they developed a metric called CalEnviroScreen. CalEnviroScreen uses environmental, health, and socioeconomic information to produce scores for every census tract in the state. Census tracts within the bottom 25% of scores using CalEnviroScreen are considered disadvantaged communities. A recent report sponsored by the Department of Water Resources recommended retiring the MHI definition of DAC from future legislation. The report also discusses how the use of the term “disadvantaged community” has been identified as stigmatizing during community outreach processes and encouraged the use of more inclusive terms such as “underrepresented community.”[32]

[32] Haalan, O., & Ortiz, P., “Disadvantaged communities nomenclature within the State of California: Findings and conclusions — A recommendation document,” *California Department of Water Resources*, 2022.

Figure 9: DAC Communities in the State Water Project Service Area

MHI Definition **CalEnviroScreen Definition**



Sources: Disadvantaged Communities Categorization, Department of Water Resources; Disadvantaged Communities Nomenclature Within the State of California: Findings and Conclusions, Department of Water Resources; CalEnviroScreen 4.0, OEHHA.
Notes: Based on Department of Water Resources' income-based disadvantaged communities definition (Left) and OEHHA's CalEnviroScreen score (right).
Disadvantaged communities have a median household income at or below 80 percent of the statewide MHI. Severely disadvantaged communities have a median household income at or below 60 percent of the statewide MHI. Calculated based on Census tract-level median income data from 2021 American Community Survey 5-year Estimates. Aggregated based on the service regions of Department of Water Resources contractors. Note that these service areas might not reflect recipients of municipal water supplies from the State Water Project. CalEnviroScreen identifies California communities most affected by pollution and where residents are more vulnerable due to socioeconomic factors. Disadvantaged communities are defined as the top 25% highest scoring census tracts based on a combined measure of environmental, health, and socioeconomic burdens. This map displays disadvantaged communities in census tracts that have more than half of their population served by the State Water Project.

Figure 9 maps census tracts that meet different definitions of 'disadvantaged community'. The map on the left panel shows census tracts within the State Water Project service area that are defined as disadvantaged or severely disadvantaged according to Department of Water Resources' definition based on median household income. Under this definition, DACs have a MHI at or below 80 percent of the statewide median household income. Severely disadvantaged communities have a MHI at or below 60% of the statewide median household income. Currently, these definitions correspond to a MHI between $47,000 and $63,000 for DACs and below $47,000 for SDACs, respectively. The map on the right panel shows the communities that are defined as DACs according to the CalEnviroScreen definition.

Comparing the distribution of DACs between the two definitions, the MHI definition classifies significantly more census tracts in the San Joaquin Valley as DACs, as average household incomes in this region are significantly lower than the state average. It also classifies significantly fewer households in the South Bay as DACs compared to the CalEnviroScreen definition, which highlights that although average household incomes are significantly higher in the South Bay, there are still many communities that face adverse health and environmental conditions.

Table 5 presents statistics for population and employment in DACs within the State Water Project service area under each definition of DAC. Under the MHI definition of DAC, there are almost 8.2 million individuals living in DAC communities in the State Water Project service area. Most of these individuals (87% or 7.1 million) live in the Southern California service area. Based on the MHI definition, 32% of individuals in the State Water Project service are considered part of DACs. In the rural San Joaquin and Feather River areas, 67% individuals are within the DACs. Overall, the CalEnviroScreen definition of DAC is less stringent than the Department of Water Resources definition. By construction, the CalEnviroScreen definition contains 25% of California's population. The measure also contains 25% of the population of the State Water Project service area, or around 6.5 million individuals, making the State Water Project service area representative of the entire state in terms of DAC populations.

Table 5: DAC Populations in the State Water Project Service Area

SWP Service Area	Disadvantaged and Severely Disadvantaged Communties (Median Household Income Definition)				Disadvantaged Communities under SB535 EnviroScreen			
	Population in DACs	% of Total Population in DACs	Full-Time Employment within DACs	Full-Time Agricultural Employment within DACs	Population in DACs	% of Total Population in DACs	Full-Time Employment within DACs	Full-Time Agricultural Employment within DACs
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Feather River	53,351	75%	19,550	2,087	23,497	33%	8,610	919
North Bay	83,473	14%	31,560	1,273	48,547	8%	18,355	741
South Bay	104,264	4%	60,303	157	109,292	4%	63,211	165
San Joaquin Valley	640,503	60%	241,204	46,192	230,075	22%	86,643	16,593
Central Coast	171,383	24%	83,419	9,143	6,243	1%	3,039	333
Southern CA	7,116,232	34%	3,192,844	19,107	6,119,975	29%	2,745,853	16,432
Full SWP Service Area	**8,169,205**	**31%**	**3,628,881**	**77,958**	**6,537,628**	**25%**	**2,925,711**	**35,182**

Sources and Notes:
[2]: Based on the Department of Water Resources' income-based disadvantaged communities definition.
Disadvantaged communities have a median household income at or below 80 percent of the statewide median household income (MHI).
Severely disadvantaged communities have a median household income at or below 60 percent of the statewide MHI.
Calculated based on Census tract-level median income data from 2021 American Community Survey 5-year Estimates. Aggregated based on the service regions of Department of Water Resources contractors. Note that these service areas might not reflect recipients of municipal water supplies from the State Water Project.
[3]: [2] / Total Population in service areas of State Water Project contractors.
[4], [5]: "2021 Current Employment Statistics (CES)," State of California Employment Development Department.

[6]: Based on CalEnviroScreen disadvantaged communities definition. CalEnviroScreen identifies California communities most affected by pollution and where residents are more vulnerable due to socioeconomic factors. Disadvantaged communities are defined as the top 25% highest scoring census tracts based on a combined measure of environmental, health, and socioeconomic burdens.
[7]: [6] / Total Population in service areas of State Water Project contractors.
[8], [9]: "2021 Current Employment Statistics (CES)," State of California Employment Development Department.

VI. The Costs of State Water Project Deliveries and Alternative Supplies

Between 2012 and 2021, the growth in retail water rates paid by households in the United States increased by 43%, surpassing growth in household income.[33] Rate increases present economic challenges particularly for low-income and underrepresented households. Although it is only one of multiple factors that have driven price increases over the past decade, the costs of water supplies, and particularly of developing new supplies, have directly influenced changes in retail rates. This section analyzes the costs paid by contractors for State Water Project deliveries in the context of the costs of developing alternative water supplies.

Under the original water supply contracts, the costs that State Water Project contractors pay for water have two main components: a Conservation Charge, and a Transportation Charge. The Conservation Charge recovers both capital costs and operation, maintenance, power, and replacement (OMP&R) costs for facilities that store and convey water, including the Oroville Dam complex, Delta facilities, and the San Luis Reservoir. This is a fixed charge based on each contractor's Table A allocation, rather than the volumes of water delivered.[34]

The Transportation Charge covers the capital and OMP&R costs of the facilities that pump and convey water from the Delta to each individual contractor. Transportation costs have a fixed component that covers the costs of conveyance facilities, as well as a variable component that covers the power-related costs needed to convey water to each contractor. The fixed component of this charge varies depending on the cost of specific segments of aqueduct the contractor uses, and the variable component depends on the cost energy used to convey water conveyed in a particular year. Contractors also pay financing costs that fully repay the revenue bonds that finance the State Water Project. These bonds account for 82% of State Water Project financing and are fully repaid by State Water Project contractors through their rate payers instead of the general taxpayers. The objective of these charges is to fully recover the costs of the original facilities by 2035.

Please note that on January 1, 2024, the Department of Water Resources is implementing the State Water Project contract extension amendment. This amendment extends the water supply contracts to 2085 and

[33] "Up 43% over Last Decade, Water Rates Rising Faster than Other Household Utility Bills," Bloomfield Research, August 23, 2021.
[34] Note that the impact of new payment terms starting in 2024 under the recent Contract Extension Amendment has not been considered in this report.

institutes a new cost recovery methodology. This report focuses on the legacy cost recovery methodology used from inception of the State Water Project.

The per acre-foot cost of water delivered by the State Water Project varies significantly from year to year because deliveries are highly variable whilst the costs are mostly fixed. However long-term average costs for project water can be estimated on an acre-foot basis by comparing the long-term averages of costs and deliveries. The approximate cost of delivering State Water Project water ranges between $250 per acre-foot in the San Joaquin Valley, to $600 per acre-foot in Southern California, and as high as $1,440 per acre-foot on the Central Coast.[35] These estimates can then be used to compare the costs of project water to the costs of developing alternative water supplies.

The costs of alternative water supplies are estimated based on various independently conducted studies from research institutes with expertise on California water issues, including the Public Policy Institute of California, California Public Utilities Commission, and the Pacific Institute. Each of them reviewed recently completed alternative water supply projects to analyze yields and cost.

These reports consider the costs of developing four alternative water supplies: desalination projects that produce potable water from seawater using reverse osmosis, recycling projects that reclaim and treat wastewater for reuse, stormwater capture projects that harvest rainwater for storage and local irrigation, and water conservation programs that include use of water-efficient appliances and toilets, as well as landscape rebates for households to replace grassy areas with drought-tolerant plants or artificial turf to reduce water consumption. From the projects reviewed by these studies, we produced cost estimates at the 25th percentile, median, and 75th percentile for each type of project.

These cost estimates should be interpreted cautiously since they describe projects that vary substantially in context and scope. Some alternative water supplies, such as recycling, and stormwater capture have significant scale economies: only large projects achieve costs at the low end of the ranges reported below, whilst small projects have significantly higher costs. Furthermore, there are geographic constraints on the locations of alternative water projects: recycled water projects are most viable when located near both water sources and potential customers; the cost of stormwater capture varies based on urban hydrology, and desalination projects need to be located near the ocean or other saline water source. The reported cost estimates only apply specifically to Southern California and projects requiring additional conveyance will be more costly. Finally, these estimates do not account for additional treatment and compliance costs associated with newer and upcoming water quality regulations; these regulations challenges for stormwater capture and recycled water projects that risk exposure to emerging contaminants.

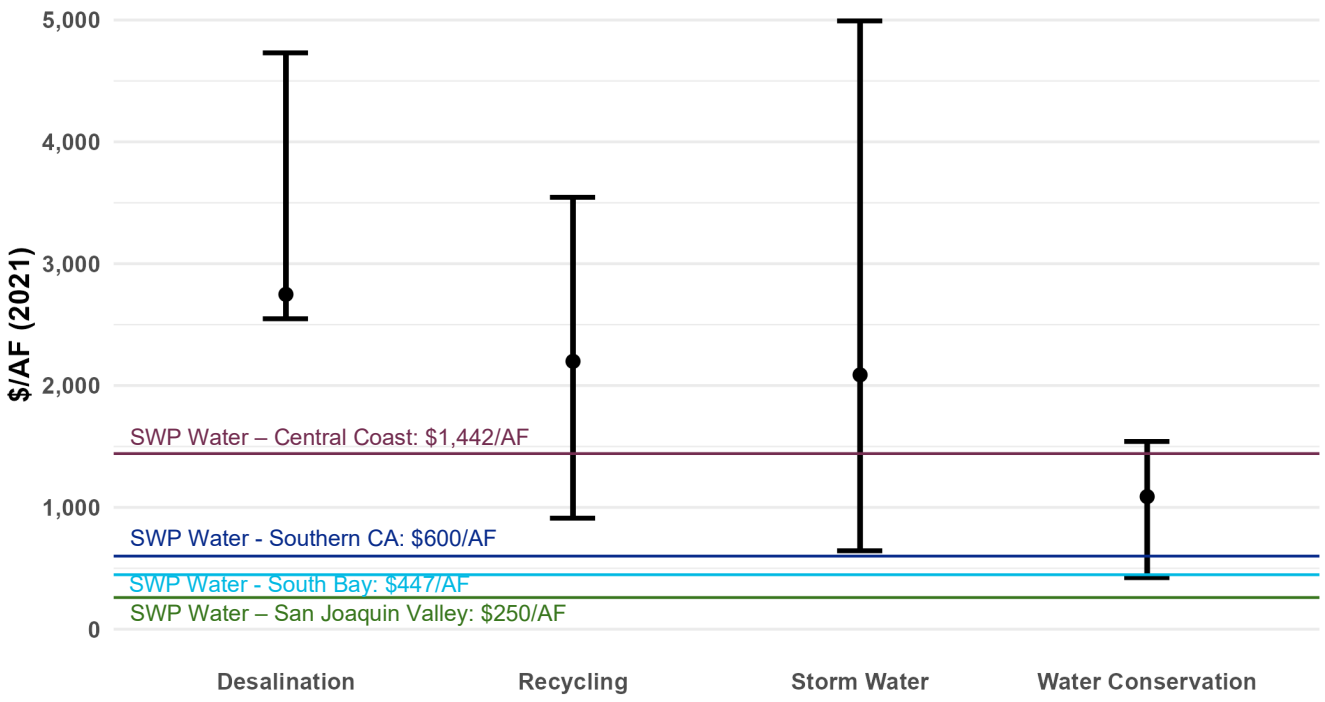
[35] California Department of Water Resources, “Bulletin 132-19, Table 13-12.”

Figure 10 below compares the costs of State Water Project deliveries to the costs of alternative water supplies. State Water Project water is more cost-effective than most water recycling programs, which have a median cost of $2,200 per acre-foot, with a range of $1,000 to $3,500, and seawater desalination facilities, which have a median cost of $2,800 per acre-foot, with a range of $2,500 to $4,700. The costs of State Water Project water are competitive when compared to alternatives like stormwater conservation programs ($600 to $5,000 per acre-foot, with a median of $2,100) and water conservation ($420 to $1,500 per acre-foot, with a median of $1,100). The water conservation efforts we consider include replacing toilets and clothes washers with high efficiency models, installing weather-based controllers and rotating nozzles for irrigation, and water capture using rain barrels. Although some water conservation programs have the lowest unit cost of water among the alternatives we consider, they are small in nature and difficult to scale. It would be difficult for these programs to replace a significant volume of State Water Project deliveries.

In addition to cost considerations, permitting and building desalination facilities in Southern California has proven to be challenging, often due to environmental considerations. Currently, desalination accounts for less than one percent of Southern California's water supply. Additionally, alternatives like recycling, stormwater management, and conservation programs are often limited in scale, often less than 10,000 acre-feet of water per year.

California's largest desalination plant in Carlsbad has an annual capacity of 56,000 acre-feet. To replace the volume of water currently provided by the State Water Project to Southern California, twenty-five additional desalination plants of the same size as the Carlsbad facility would need to be permitted and constructed. This highlights the significant challenges in ensuring water supply reliability and underscores the crucial role the State Water Project will continue to play in California's future water security.

Figure 10: The Cost of Developing Alternative Water Supplies to the State Water Project



Sources: Cooley, H., and Phurisamban, R., "The Cost of Alternative Water Supply and Efficiency Options in California," *Pacific Institute*; Sencan, G. and Escriva-Bou, A., "Water Partnerships between Cities and Farms in Southern California and the San Joaquin Valley," *Public Policy Institute of California*; Marie, S., "What Will Be the Cost of Future Sources of Water for California?," *California Public Utilities Commission*; Bulletin 132-2019.
Notes: State Water Project Water Costs for Central Coast, Southern CA and South Bay denoted with solid horizontal lines. State Water Project Water Costs based on Bulletin 132-2019 Table 13-2. Based on Capital, OM&R and Power Charges. Costs adjusted for inflation to 2021 dollars.
Costs of Developing alternative water supplies based on 25th percentile, median and 75th percentile cost estimates included in PPIC, CPUC and Pacific Institute report. The medians of low, median and high estimates are calculated across the three reports. Cost estimates include both large and small water supply projects (> 10,000 & < 10,000 AFY). Desalination cost estimate includes costs for saltwater desalination, but not brackish water. Recycling costs are for indirect potable reuse recycling projects. Water Conservation estimates cover a range of different conservation programs including efficient appliance replacements for toilets and clothes, installing weather-based controllers and rotating nozzles for irrigation, and water capture using rain barrels. Stormwater capture costs are based on the quantiles of proposed projects included in various state databases; See Cooley et. al (2019) for further details.
Costs adjusted for inflation to 2021 dollars.

References

Academic articles and publications:

Cooley, H., and Phurisamban, R. “The Cost of Alternative Water Supply and Efficiency Options in California.” *Pacific Institute*.

Guzman, Gloria. “Household Income 2021, American Community Survey Briefs,” *US Census Bureau*, October 2022, https://www.census.gov/content/dam/Census/library/publications/2022/acs/acsbr-011.pdf.

Huld, Arendse. “Regional Demographic Trends in China: Birth Rates, Population Changes, and Domestic Migration.” China Briefing, accessed September 29, 2023, https://www.china-briefing.com/news/chinas-population-by-province-regional-demographic-trends/.

Linde, Steve. “Israel Has Become a Water Powerhouse.” *The Jerusalem Post*, accessed September 29, 2023, https://www.jpost.com/business-and-innovation/energy-and-infrastructure/article-733790.

Marie, S. “What Will Be the Cost of Future Sources of Water for California?” *California Public Utilities Commission*.

Rennenkampf, Lenore. “National Register of Historic Places nomination, Old Croton Aqueduct.” *U.S. National Archives*, accessed September 29, 2023, https://catalog.archives.gov/id/75322997.

Sencan, G. and Escriva-Bou, A. “Water Partnerships between Cities and Farms in Southern California and the San Joaquin Valley.” *Public Policy Institute of California*.

Shumilova, Oleksandra, Klement Tockner, Michele Thieme, Anna Koska, and Christiane Zarfl. “Global Water Transfer Megaprojects: A Potential Solution for the Water-Food-Energy Nexus?.” Frontiers in Environmental Science, Vol. 6 (2018), https://doi.org/10.3389/fenvs.2018.00150.

Zhou, Qian. “China's Most Productive Provinces and Cities and per 2021 GDP Statistics.” *China Briefing*, accessed September 29, 2023, https://www.china-briefing.com/news/chinas-2021-gdp-performance-a-look-at-major-provinces-and-cities/.

Publicly available sources:

"A History of the NYC Water Supply System.” Duke Geological Laboratory, accessed September 29, 2023, https://www.dukelabs.com/ForTeachers/NYC_Water_Supply/NYCWaterSupply.htm.

"Administrative Map of Spain.” One World - Nations Online, accessed September 29, 2023, https://www.nationsonline.org/oneworld/map/spain-administrative-map.htm.

“California Agricultural Production Statistics.” California Department of Food and Agriculture, accessed September 29, 2023, https://www.cdfa.ca.gov/statistics/.

"Distribution of Gross Domestic Product (GDP) of Mexico in 2021, by Federal Entity.” Statista, accessed September 29, 2023, https://www.statista.com/statistics/1289347/gdp-mexico-city-share-total-mexico-gdp/.

"GDP (Current US$) - Israel.” The World Bank, accessed September 29, 2023, https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=IL.

"Mexico: Gross Domestic Product (GDP) in Current Prices from 1987 to 2028.” Statista, accessed September 29, 2023, https://www.statista.com/statistics/263580/gross-domestic-product-gdp-in-mexico/.

"Out of the Archives: 75 Years of Delaware System Water.” NYC Water, accessed September 29, 2023, https://medium.com/nycwater/out-of-the-archives-75-years-of-delaware-system-water-3106a518caee.

"PIB de las Comunidades Autónomas [GDP of the Autonomous Communities].” Expansíon, accessed September 29, 2023, https://datosmacro.expansion.com/pib/espana-comunidades-autonomas.

"Principales referencias del Trasvase Tajo-Segura relacionadas con el regadío [Main references of the Tajo-Segura transfer related to irrigation].” El Regadío, accessed September 29, 2023, http://elregadio.blogspot.com/2014/11/principales-referencias-del-trasvase.html.

“Projects and Facilities.” San Gorgonio Pass Water Agency, accessed November 17, 2023, https://www.sgpwa.com/projects-facilities/.

"Rajasthan Budget Analysis 2022-23.” PRS Legislative Research, accessed September 29, 2023, https://prsindia.org/budgets/states/rajasthan-budget-analysis-2022-23.

"SPAIN: Administrative Division - Autonomous Communities and Provinces.” City Population, accessed September 29, 2023, http://www.citypopulation.de/en/spain/admin/.

“2021 American Community Survey 5-year Estimates.” US Census Bureau, accessed September 2023, https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/.

“Bulletin 132 Management of the California State Water Project.” California Department of Water Resources, accessed September 29, 2023, https://water.ca.gov/Programs/State-Water-Project/Management/Bulletin-132.

"Cal EnviroScreen 4.0." California Office of Environmental Health Hazard Assessment, accessed September 29, 2023, https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40.

"County Business Pattern." US Census Bureau, accessed September 29, 2023, https://www.census.gov/programs-surveys/cbp.html.

"DAC Mapping Tool." Department of Water Resources, accessed September 29, 2023, https://gis.water.ca.gov/app/dacs/.

"Economy, Jobs and Business Insights." Remplan, accessed September 29, 2023, https://app.remplan.com.au/goldfieldsesperanceregion/economy/industries/gross-regional-product?state=qNwJFd!3yvMcmzLXuMxJj1HRbyeqf1tjIdA9CDIaIQcKIkgN.

"Employment by Industry Data." Employment Development Department, accessed September 29, 2023, https://labormarketinfo.edd.ca.gov/data/employment-by-industry.html.

"GDP Ranking." The World Bank Group, accessed September 29, 2023, https://datacatalog.worldbank.org/search/dataset/0038130.

"Goldfields Water Supply Scheme (GWSS), Goldfields." Water Technology, accessed September 29, 2023, https://www.water-technology.net/projects/goldfields-water-supply-scheme-gwss-australia/.

"Gross Domestic Product." Bureau of Economic Analysis, accessed September 29, 2023, https://www.bea.gov/data/gdp/gross-domestic-product.

"Israel Has Become a Water Powerhouse." The Jerusalem Post, accessed September 29, 2023, https://www.jpost.com/business-and-innovation/energy-and-infrastructure/article-733790.

"Population and Housing Unit Estimates." U.S. Census Bureau, accessed September 29, 2023, https://www.census.gov/programs-surveys/popest.html.

"Regional GDP data (2021)." Bureau of Economic Analysis, accessed September 29, 2023, https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas.

"Reverse water carrier launched to refill Kinneret." Globes, accessed September 29, 2023, https://en.globes.co.il/en/article-reverse-water-carrier-launched-to-refill-kinneret-1001433880#:~:text=Mekorot%20Israel%20National%20Water%20Co,Kinneret%20(Sea%20of%20Galilee).

"South-to-North Water Diversion Project, China." University of Chicago, accessed September 29, 2023, https://ceas.uchicago.edu/sites/ceas.uchicago.edu/files/uploads/sti2010-okeefe-water-diversion-china.pdf.

"South-to-North Water Diversion Project." Water Technology, accessed September 29, 2023, https://www.water-technology.net/projects/south_north/.

“Summary: Cutzamala System.” Auburn Sciences and Mathematics, accessed September 29, 2023, https://www.auburn.edu/cosam//departments/geosciences/geosciences-faculty/chaney/ibtwater/cutzamala.htm.

“The Cutzamala System.” Water for Urban Areas, Foods and Nutrition Library, accessed September 29, 2023, https://www.nzdl.org/cgi-bin/library?e=d-00000-00---off-0fnl2.2--00-0----0-10-0---0---0direct-10---4-------0-1l--11-en-50---20-about---00-0-1-00-0--4----0-0-11-10-0utfZz-8-00&cl=CL1.5&d=HASH7ecfef951c65b8a6f0da56.8.5.2&gt=1.

“The Integrated Water Resource Plan.” The Metropolitan Water District of Southern California, accessed September 29, 2023, https://www.mwdh2o.com/how-we-plan/integrated-resource-plan/.

"Up 43% over Last Decade, Water Rates Rising Faster than Other Household Utility Bills." Bloomfield Research. August 23, 2021. Accessed October 24, 2023. https://www.bluefieldresearch.com/ns/up-43-over-last-decade-water-rates-rising-faster-than-other-household-utility-bills/.

“Water Plan Water Balance Data.” California Natural Resources Agency, accessed September 29, 2023, https://data.cnra.ca.gov/dataset/water-plan-water-balance-data.

“南水北调东线工程通水十年：直接受益人口超 8300 万 综合成效显著 [Been Operating for 10 Years, the Eastern Line of the South-to-North Water Diversion Project Achieved Phenomenal Success, Directly Benefiting over 83 Million Residents].” 中国新闻网.

"南水北调中线 14 时 32 分通水 寓意全长 1432 公里 [First Deliveries of the South-to-North Water Transfer Project Started at 14:32pm, Symbolizing a Total Length of 1432 km].” 网易新闻

"江水北调工程[South-to-North Water Diversion Project (Phase One of the Eastern Line)].” Jiangsu Province Water Board

"南水北调大事记 [Milestones of the South-to-North Water Diversion Project].” 人民网

"苏北的五座城市，正在成为江苏经济增长的重要推手！ [These 5 cities in Northern Jiangsu are Emerging to Be the Main Drivers of Jiangsu's Regional Economic Growth].” Baijiahao

"超 90 亿立方米 南水北调中线一期工程完成年度调水计划 [Over 9 Billion Cubic Meters, the First Phase of the South-to-North Water Diversion Project (Central Line) Accomplished Its Annual Water Transfer Target].” 央广网